The Farm

QUARTERLY

SPRING 1949 • PRICE 60 CENTS

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TECHNOLOGY & SCIENCE

APR 1 6 1949

The family that looks ahead won't overlook

WILSON

Because Wilson Sectional Reach-In Freezers will grow with the family needs . . . you simply add additional sections.

and Wilson Sectional Reach-In Freezers . . .

. . . have big quick-freeze compartments.

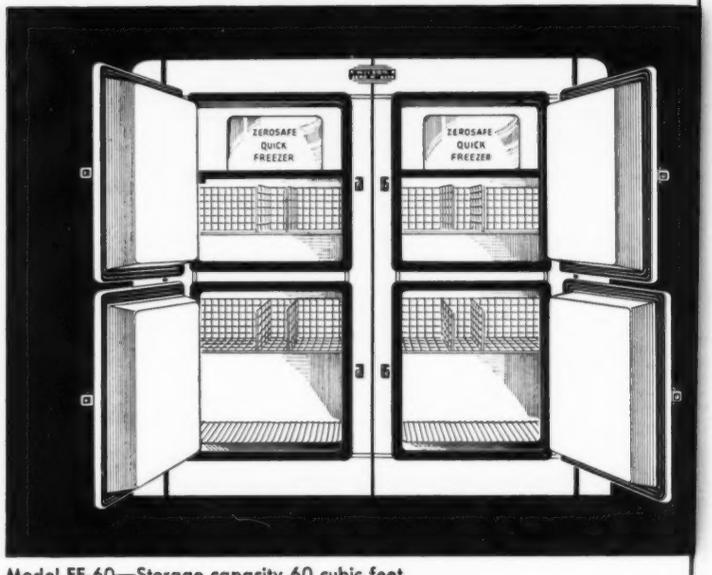
. . . are upright and take up little space.

. . . have easy access storage shelves—permits quick handling of food.

. . . are insulated with 5¾" of Fiberglas.

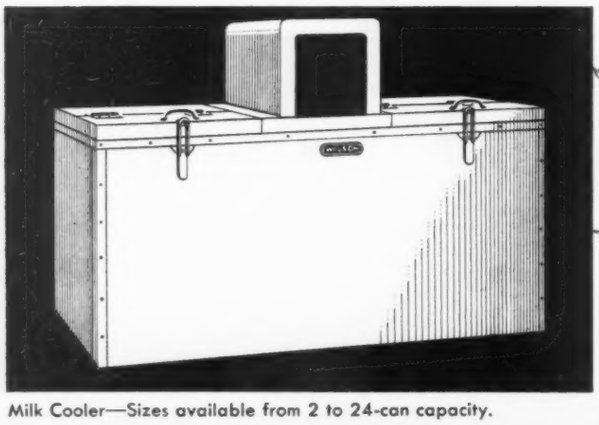
. . . have front opening convenience which makes the food easy to reach.

so The Wilson "Zero°Safe" Freezer is the complete freezer for the farm. Modern front-opening convenience in a freezer that grows with the need. You simply add additional sections to the original unit. Each section is fully portable and is easily made an integral part of the unit. Wilson "Zero°Safe" occupies the smallest possible amount of floor space per cubic foot of capacity.



Model FF-60—Storage capacity 60 cubic feet.
Other sectional models from 22 to 120 cubic feet.

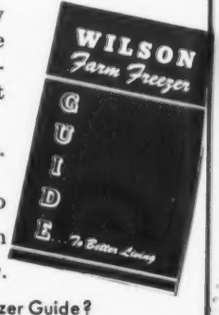
Then too! WILSON AUTOMATIC MILK COOLERS



Milk Cooler—Sizes available from 2 to 24-can capacity.

Wilson has a complete line of automatic high water level milk coolers. The Wilson Zero-Flow Milk Cooler provides twin-cooling—twin-storing compartments . . . *it cools two milkings and stores both.* And like all Wilson Refrigeration, the Zero-Flow Milk Cooler has low operating and maintenance costs . . . it has life tested construction . . . sanitation is easy . . . there are no gadgets to get out of order.

There is a Wilson Milk Cooler to fit your needs.



Why don't you? Join the many farm families who have looked them all over and then picked Wilson. When you buy Wilson you buy *efficiency, economy, and durability.*

Have you sent for your copy of the Wilson Freezer Guide?
It's your guide to better living.

WILSON REFRIGERATION, INC.

DIVISION OF WILSON CABINET CO., INC., SMYRNA, DELAWARE

FARM MILK COOLERS and FREEZERS

DEALERS EVERYWHERE OR WRITE US DEPT. FG-5

Farmall Cub

the FARMALL SYSTEM for another million farms

The Farmall System is mechanized farming that has proved its advantages to a million satisfied owners.

The Farmall Cub now makes the Farmall System available to *another* million farms. It's a modern power-package, scaled down for all-job, small-acreage duty—or profitable large-farm utility. It has 20 inches of row clearance; its wheel treads adjust to various row spacings.

The Farmall Cub has 16 matched, quick-change, direct-connected implements. That's why it's an all-purpose, all-season work unit on any diversified farm!

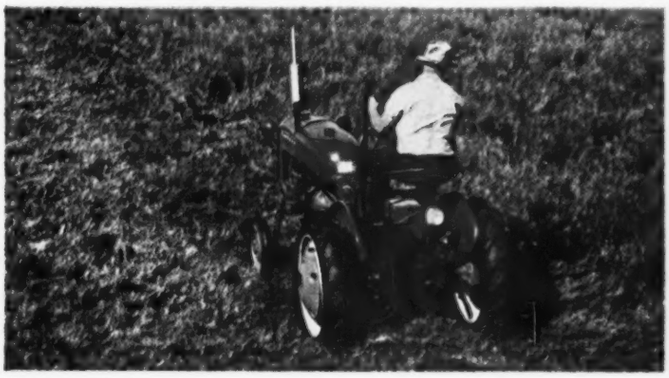
International Harvester builds the Farmall Cub with the power to replace 2 or 3 horses or mules . . . and to do a lot more, besides. *Because of its range of speeds, you can mow, or cultivate, for example, twice as much acreage per day as with animal power.* In addition to pulling drawbar loads, the Farmall Cub operates mounted equipment, belt and power take-off machines, and produces hydraulic power to control implements.

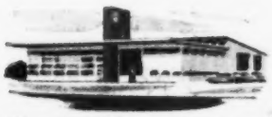
Attach your Farmall Cub's direct-connected plow, and do 3 to 3½ acres of good plowing in a 10-hour day. Prepare 1½ acres or more of gardenlike seedbed per hour with this versatile tractor and its disk or spring-tooth harrow. Plant or cultivate 10 or 12 acres daily of close-row vegetables or standard-spaced corn or cotton. *Average under 3 quarts of gasoline hourly, on your year's work.*

On the Farmall Cub with Farmall Touch-Control, you ride in comfort—steer with automotive ease—control your Farmall Cub's mounted, quick-change and direct-connected implements by hydraulic power, with a finger-tip touch.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue **Chicago 1, Illinois**

NATIONAL FARMALL CUB MONTH
See your International Harvester dealer during February, National Farmall Cub Month. Cubs with complete equipment are available.





This modern building symbolizes the expanded service facilities of IH dealers throughout America.

Listen to James Melton on "Harvest of Stars" every Wednesday night over CBS.

INTERNATIONAL HARVESTER

1½ ton model with 12-foot platform stake

Get a Good Start on the Busy Months Ahead with a Fine New Studebaker Truck!

Revolutionary new Studebaker truck design saves you time and money!

More sizes and wheelbases than Studebaker ever offered in a line of trucks! Streamlined half ton, three-quarter ton (shown above) and one ton pick-ups that are new marvels in easy loading and unloading! New 1½ ton and 2 ton models, too. At no extra cost—full cab equipment from window wings to foot-controlled ventilators.

THE word gets 'round mighty fast when a handsome, husky, 1949 Studebaker truck arrives on a farm.

Neighbors come over for a close-up look. This is the first new truck in years that's really different.

From its streamlined front end all the way back, everything about a 1949 Studebaker truck is brand new in design. Even the steps are enclosed inside the doors of the driver's cab—new sure-footedness in bad weather!

The wide doors have automatic "hold-open" stops. The low floors save plenty of climbing.

There's hip room, head room and leg room to spare—a 3-way-adjustable 3-man seat—nearly 23% new window and windshield visibility!

There's a new kind of "lift-the-hood" accessibility, too. You reach right in over the close-set fenders. No standing on a box to get at engine, ignition, instrument and accessory connections.

You ride in new comfort—drive with new ease—get remarkable operating economy—spend surprisingly little for repairs—thanks to Studebaker's revolutionary new truck engineering and trustworthy father-and-son craftsmanship.

Stop in at a Studebaker showroom and get first-hand information now. See why the rugged, distinctive, new 1949 Studebaker trucks are a sensation across the nation.

STUDEBAKER TRUCKS

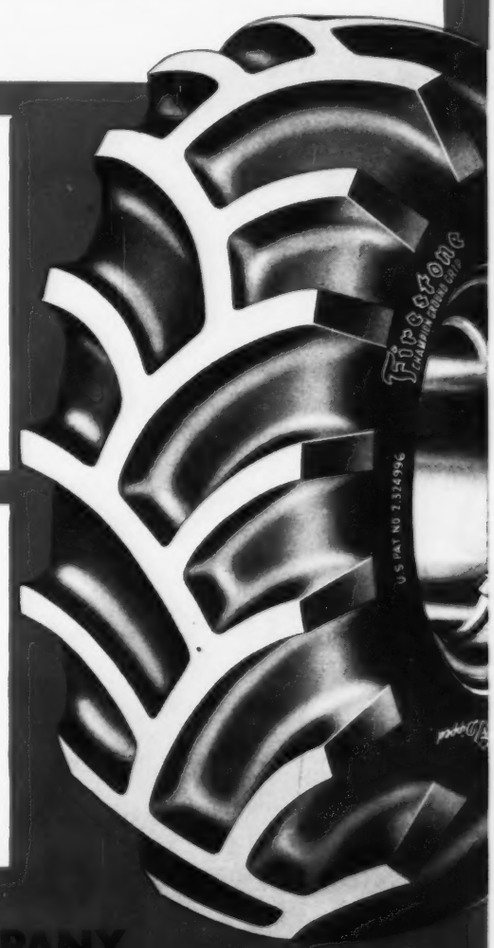
NOTED FOR LOW COST OPERATION

© The Studebaker Corporation, South Bend 27, Indiana, U.S.A.

Firestone OFFERS THREE POSITIVE WAYS TO GET MORE DRAWBAR PULL FROM YOUR TRACTOR

1 EQUIP YOUR TRACTOR WITH Firestone CHAMPION GROUND GRIP TRACTOR TIRES

For greater drawbar pull, get the tires that deliver the greatest tread bar pull — Firestone Champions. It's no wonder they OUTpull all other tractor tires. One look at the tread bars is enough to tell why this tire outperforms all other tires. Anyone can see that these bars take a *deeper bite* because they're higher, a *bigger bite* because they're longer, a *stronger bite* because they're Triple-Braced, and a *sharper bite* because they're especially curved for self-cleaning.



2 HAVE YOUR TIRES HYDRO-FLATED

Firestone Hydro-Flation insures the right liquid-air ratio for maximum traction. You get enough liquid weight to insure maximum drawbar pull, enough air cushion to protect your tires against dangerous body shocks.

3 INFLATE YOUR TIRES TO 12 POUNDS

By using only 12 pounds pressure, the whole tread is in full contact with the ground for greater drawbar pull. You can do this safely with Firestone Champion Ground Grip Tractor Tires because the sidewalls are reinforced for low-pressure operation.

THE FIRESTONE TIRE & RUBBER COMPANY

AKRON, OHIO • MEMPHIS, TENNESSEE • LOS ANGELES, CALIFORNIA

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The SURGE does *Automatically* what other machines have to be helped to do to get the *EXTRA MILK*

ASK YOUR NEIGHBOR WHY HE LIKES HIS SURGE

Surge

BABSON BROS. CO.
2843 W. 19th St., CHICAGO

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COMING IN SUMMER

The evenings are short on the farm in summer and what a farmer reads should be practical and to the point. The editors of *The Farm Quarterly* believe that the Summer issue will include more than the usual number of articles which will help farmers make more money easier and yet be easy to read on a hot Sunday afternoon.

How to manage the best rotation for soil building has been a problem in recent years, because corn and wheat are harvested late by machines. The all-crop grain dryer is one answer to this problem. How it is made and used is the subject of a full-dress article. A leading stock article describes the Missouri System of feeding out range calves. It will be told by C. M. Long, who introduced the system to Indiana farmers. Since the war, stock feeders have heard a great deal about distillers grains and solubles. *Farm Quarterly* will be the first magazine to publish a detailed article on how these high protein products are made and fed, and how they compare with other protein supplements. A member of our staff went to Louisiana and lived on a Cajun farm to find out how the sweet potato and cotton farmers live, and what they do on a Saturday night in the bayous. To lighten up the typical *Farm Quarterly* information on crops and stock, there will be a whimsical profile of the gardener's friend, the hop toad.

Farmers who wonder how prices for their grains are set and how grain is graded at the elevators will find an answer straight from the dealers and inspectors themselves in the Summer *Quarterly*.

Landlords and tenants sometimes have difficulty in solving the problems of contracts and personal relationships. *The Farm Quarterly* has consulted big farm management operators and small absentee landlords, as well as their tenants, and will present a survey of the best practices in an article, "Landlord-Tenant Relationships."

A former official of a farm machinery factory has made a hobby of early reaping and threshing machinery and has many photographs of historical importance on the subject of the combine. His story is as interesting as melodrama.

Other subjects for the coming issue include Angora Rabbits, Broom Corn, Sugar Beets, Terracing, and a success story on the legendary Stark family which has been in the nursery business for generations and has contributed largely to the billion dollar fruit industry of the nation.

THE FARM QUARTERLY
22 East 12th St., Cincinnati 10, Ohio

R. J. McGinnis.....**Editor**
Fred Knoop.....**Executive Editor**
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George Laycock.....**Associate Editor**
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Contents

THE FARM QUARTERLY

Spring 1949 Vol. 4 No. 1

	Page
STOCK	
Newcastle Disease	38
How To Feed Hogs	72
Acetonemia	84
SOIL	
Fertilizer	30
How Much Grass?	58
CROPS	
Herbs	42
Canned Grass	48
New Work For Buckwheat	56
Sunflowers	64
FEATURES	
The Grand Prairie	22
Mr. Tripett Digs A Post Hole	36
Cow Dog	52
It's The Law	68
The Two-Faced Cat	76
Saving Wood	80
DEPARTMENTS	
Letters	8
The Dairy Barn	16
Farm Books	20

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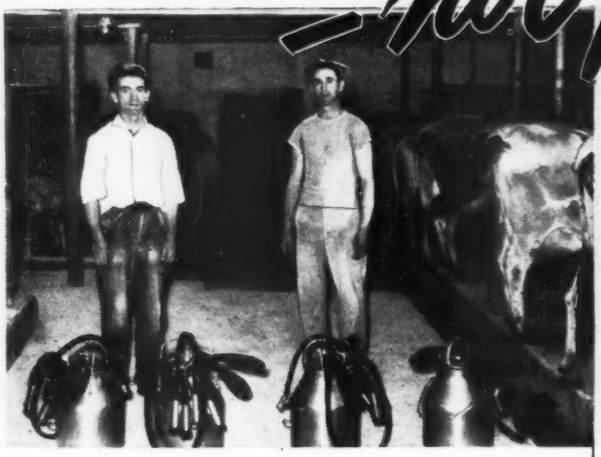
PROOF — not promises!



30 YEARS OF DE LAVAL MILKING...AND MORE TON-OF-GOLD COWS THAN ANY OTHER HERD IN THE WORLD!

Famous Brigham Farm, St. Albans, Vt., has used the De Laval Milker on its great herd of home-bred Jerseys for 30 years. Every cow in this herd has been milked twice a day throughout her entire lifetime with the De Laval. As evidence of udder health and proper milking during this long-time program we offer the following:

•

- **10-year herd average is 513 lbs. butterfat on more than 100 cows.**
- **For seven successive years herd average on more than 100 cows exceeded 500 lbs. (See table.)**

Year	Cows	Milk	Test	Fat
1947	111	9942	5.3	530
1946	127	10529	5.29	543
1945	143	10058	5.24	527
1944	141	10171	5.11	520
1943	127	10053	5.26	529
1942	112	10116	5.11	517
1941	124	9739	5.26	512

(Each yearly average is a record for the Jersey breed)

- **81 Brigham Farm bred, owned and developed cows have Ton-of-Gold Award. (More than any other herd in the world.)**
- **586 individual records have been made exceeding 500 lbs. fat per year.**
- **178 exceeded 600 lbs; 5 exceeded 700 lbs.**
- **272 cows have made 1000 lbs. of fat or more; 87 have lifetime records from 2000 to 2999 lbs. fat; 44 from 3000 to 3999; 18 from 4000 to 4999; 13 from 5000 to 5999 and 6 over the 6000 lbs. fat or 3-ton total.**

•

Mr. E. H. Brigham, owner, says: "We have had a De Laval Milker since 1919 or about 30 years. It has never injured a cow's udder or teats and always milks thoroughly and uniformly."

Cesaire Lacoste, herdsman, says: "With the De Laval Magnetic Speedway Milker we milk 57 cows in 57 minutes with 2 men operating four units. On other farms I have used 3 other makes of milkers. De Laval Milkers are best in every respect and always milk cleanly and uniformly."

When are *you* going to change to the new De Laval Magnetic Speedway Milker—for healthier udders... maximum production per cow ...greatest profits?

"magnetic heart"

ONLY DE LAVAL

Only the De Laval Magnetic Speedway Milker gives you the "Magnetic Heart" which assures UNIFORM milking and which means highest milk yield per cow, greatest profits.

De Laval

THE DE LAVAL SEPARATOR COMPANY

165 Broadway, NEW YORK 6

427 Randolph St., CHICAGO 6 · 61 Beale St., SAN FRANCISCO 5

The De Laval Separator Company, Dept.
165 Broadway, New York 6, N. Y.
Please send me printed matter on.

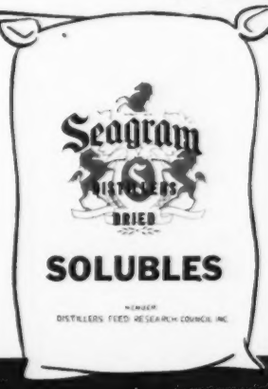
- ☐ De Laval Milkers
- ☐ De Laval Separators
- ☐ De Laval Freezers
- ☐ De Laval Water Heaters
- ☐ De Laval Milking Truck
- ☐ De Laval Can Hoist

Name_____

Town_____ RFD_____ State_____

This your poult?

Could be! There's no reason why every poult in your pens can't have this same fine textured tenderness, this same plump breasted extra finish, by next Thanksgiving. With a Seagram Solubles balanced ration*, your turkeys, broilers, layers, will grow faster, stay healthier, produce better eggs and better eating . . . . in *FEWER WEEKS* on *FEWER POUNDS OF FEED.*



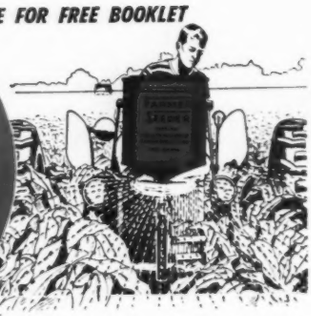
**Write for free booklet giving ration formulas for all types of poultry and livestock feeding.*

JOSEPH E. SEAGRAM & SONS, INC.
GRAIN PRODUCTS DIVISION • BOX 240, LOUISVILLE 1, KENTUCKY

Seagram SERVICE TO AGRICULTURE

WRITE FOR FREE BOOKLET

The THE ALL-ELECTRIC FARMER BROADCAST SEEDER



MOUNTS ON FRONT or BACK OF YOUR TRACTOR, TRUCK, JEEP or CAR

A FAST and EASY WAY *to broadcast* ANY COVER CROP AT THE LAST CULTIVATION OF CORN—HARVEST OF POTATOES, etc.

● DOES NOT THROW SEED OR GRAIN ON YOUR VEHICLE, THEREFORE CAN BE MOUNTED ON FRONT OR REAR OF YOUR VEHICLE AT ANY DESIRED HEIGHT ● IS OPERATED FROM DRIVER'S SEAT ● ABOVE ALL, THE FARMER BROADCAST SEEDER IS FAST AND ECONOMICAL.

SOWS UP TO 15 ACRES PER HOUR ● IS EASY TO MOUNT AND OPERATE ● BROADCASTS GRASS SEED 30 FT., GRAIN 25 FT. ● FITS YOUR CAR TRUCK, JEEP OR TRACTOR ● IS POWERED FROM YOUR OWN BATTERY ● SOWS ANY SEED OR GRAIN THAT CAN BE BROADCAST

Remember, the Farmer Broadcast Seeder is NOT operated from power take-off, but comes complete with an individual electric motor.

You may order the seeder with or without an individual electric AGITATOR. Agitator is optional at extra cost.

WITH YOUR TRUCK YOU CAN CARRY YOUR SEEDS AND SOW FIELDS REGARDLESS OF DISTANCE

BOLT THE SEEDER TO THE TRAILER HITCH, AND HOOK MOTOR WIRE TO TAIL LIGHT

SLASH YOUR FEEDING COSTS

with Wood, Steel Clad Farmer Feeders. These units are well engineered: kiln dried siding, heavy galvanized steel trough lids, suspended mechanical agitators, reinforcements and oval roof construction. We have a feeder for any of your needs. Feeders are covered with two coats of orange enamel for years of weather protection. Get a feeder that gives you long life, is low in price and designed, tested, proved by successful hog raisers. Write for Free booket today!

No. 8 FARMER FEEDER

No. 2 FARMER FEEDER

WHY BUY TWO WHEN ONE WILL DO?

Vacuum type hog fountains for year 'round use. Here you have a summer and winter fountain all in one. Easy to move, easy to clean, easy to fill, no crowding—a quality product that assures you of long life performance. Write today for complete Free Illustrated details.

VT 85 FARMER FOUNT

FARMER FEEDER Company, Incorporated CAMBRIDGE CITY, INDIANA

QUALITY FARM EQUIPMENT that means greater profits

Manufacturers of Quality Farm Equipment

PRODUCTION WOOD CRATING Chicken Coops, Produce Crates

LETTERS

RED ANGUS

Dear Sirs:

Lloyd D. Miller states that, "Angus have been black and hornless since the dawn of recorded history." The latter may be true, but not the former. As I understand it the breed was red until about a century ago.

I should like to quote from one of our farming journals, "The Farmer and Stockbreeder":

"Quite a flutter was caused by the first red Aberdeen-Angus ever seen at a Royal Show. This was Mr. E. L. C. Pentecost's Red Eagle, which ran second to the male champion. Red was the original color of the breed, up to 90 years ago. Mr. Pentecost has 12 of this color, run as a separate unit. They are in demand in Argentina and South Africa. Mr. Pentecost exported one to South America last back-end."*

I wasn't aware that this breed's color was other than black. I should like to express how much I enjoyed your publication which I acquired on a recent visit to Canada. American publications especially Journals are almost unobtainable here; should any of your readers care to exchange farming journals I should be happy to cooperate.

J. S. Wilson
65 Wrekin Dr.

Salop, England

P. S. *To the English, back-end means autumn.—J. S. W.

DEEP LITTER IN THE GARDEN OF EDEN

Sir:

I have just read the article in the Autumn number of *The Farm Quarterly* entitled, "Lazy Man's Henhouse". What impressed me was not that the deep litter is so satisfactory because of the beneficial effect it has on the chickens, as the lack of knowledge on the part of the "experts" in poultry research as to why this should be so.

We all know that the top soil of the earth, together with air, light, and water, is the only thing which will produce and maintain life and health.

No wonder chickens kept on well manured, dry deep litter do so well. They are living on the very foundations of Mother Nature's best and healthiest soil. Add a little earth and lime and you have the original soil as found by Adam in the Garden of Eden.

I do just that. I feed green plants and grass in summer and cabbage and kale in fall and winter. I pull up the plants and shake only a part of the soil off the roots. The chickens get a lot of this rich earth and what they don't eat they mix with the litter. The earth in which my plants are raised is enriched with compost (made according to the Howard process) and I really believe that the plants and earth eaten by my chickens provide all the medicines and vitamins any chickens need.

Leonard H. Fisher

Williamsport, Pa.

MULTIFLORA SUPPLY SHORT

Sir:

The article on Rosa Multiflora (Winter 1948) entitled "Living Fence" sure started things.

I received so many inquiries it was impossible to answer all of them and I would appreciate your noting this in your next issue and tendering my apology.

I had no roses. I had been receiving inquiries during summer and fall because the USDA, Cornell College, and some county agents referred people to me since I had advertised multiflora rose in 1947.

Arthur Dummett

Bernardsville, N. J.

Most sources of multiflora report a short supply this summer. Ed.

OPERATION BAT

Dear Sir:

We have an old farm house to which is attached a shed. Each evening about dusk we are forced inside the house on account of bats. They come from under the shed and seem to roost in cracks and crevices. We have burned sulphur candles but it does no good.

Would you be good enough to tell us what we can do to get rid of these pests?

Gertrude Brewer

Batavia, N. Y.

Dear Miss Brewer:

It is rather ironic that I should answer your letter, since I counted 1,327 bats coming from the attic of a building on my farm last week. They do give me a mild case of the creeps, but knowing how well they are keeping down the insect life around the place, I am happy to put up with them.

I have talked to Karl Maslowski, the naturalist, who has written two *Farm Quarterly* articles. He advises that the best way to get rid of

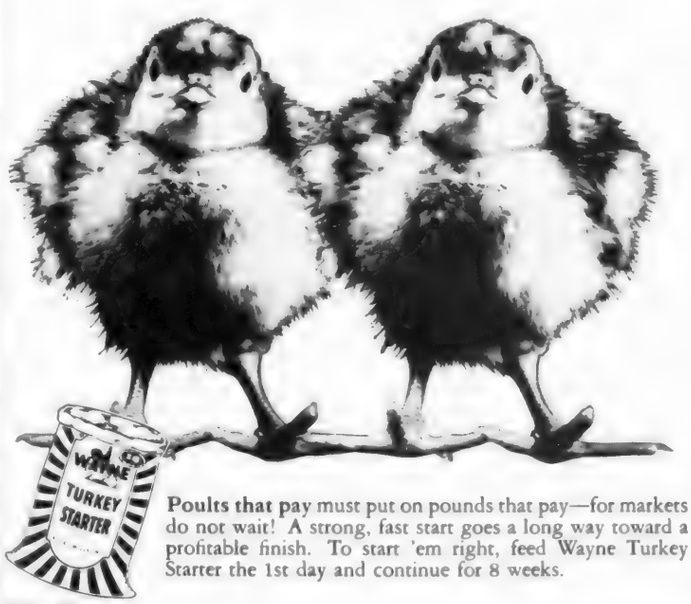
(Continued on page 110)

. . . they deserve the BEST

This Year . . . Start 'em *Right* on WAYNE Starting FEEDS . . .

Experience proves the most vital time in the whole life-cycle of any class of poultry or livestock is the *starting* period. Here are the triple-tested Wayne Starting Feeds that help you be *sure* you are giving your young stock the strong start they deserve.

New way to raise calves! Wean 36 hours after birth—stop milk feeding in just 30 days—save up to 1,000 lbs. milk on each calf over old-fashioned whole milk feeding. Wayne Calf Starter, and Wayne Way of calf raising, can help you raise better calves at lower cost.



Poults that pay must put on pounds that pay—for markets do not wait! A strong, fast start goes a long way toward a profitable finish. To start 'em right, feed Wayne Turkey Starter the 1st day and continue for 8 weeks.

Records on 1,524,660 chicks—in 5,046 flocks in 32 states, under varying conditions . . . showed an average of 96.7% livability and 20.5 oz. of weight . . . on only 2 lbs. of Wayne Chick Starter. Aren't results like these what *you* want?

Pigs *relish* the rolled oats and other quality ingredients in Wayne Pig Starter. Nutritious, palatable, economical . . . it fits them for fast gains—early market-topping finish. Feed straight from bag, from 2 wks of age until 2 wks after weaning.

Every year, more and more farmers are starting their pigs, calves, baby chicks and poults on the road to extra profits with Wayne "IQ" Starting Feeds. This year, start *yours* on Wayne. Ask your friendly Wayne Feed Dealer today about the proved *Wayne Way* to results and profits *you* want . . . or send coupon below.

SEND FOR BULLETINS ON STARTING YOUNG STOCK

ALLIED MILLS, INC.
FORT WAYNE 1, INDIANA

Please send free feeding information on:

☐ CALVES ☐ BABY CHICKS ☐ TURKEYS ☐ PIGS
☐ BROILERS

..... (Name)

..... (Address or R.F.D.)

..... (Town) ..... (State)

Ford

TRACTOR

All over America, it's proving itself a

YEAR 'ROUND TRACTOR

➡ *all 'round performance*

Naturally, you first think of a tractor in connection with field work. And, the more you use a Ford Tractor in the fields, for plowing, discing, cultivating and the like, the more respect you have for the way it buckles down to heavy pulling and tough going . . . for the way it "takes the toil out of the soil" and the amount of work it helps you get done in a day.

Here's a tractor that can handle a really tough plowing job and bring new speed and efficiency to other kinds of heavy field work. It's a tractor that will please you with the quality of its work and surprise you with its economy.

➡ *all 'round the farm*

On most farms, there's more time-consuming drudgery *outside* the crop fields than in them. With a Ford Tractor and the right Dearborn Equipment, you can put power and speed into such jobs as scraping, leveling, loading, ditching, terracing, excavating, digging post holes, sawing wood, or clearing snow.

You can get to and from these jobs in a hurry, lift and lower most Dearborn Implements by a finger touch with Ford Tractor Hydraulic Touch Control and change from one implement to another with astonishing speed. You can save countless hours of heavy muscle-work a year.

➡ *all year 'round*

All of this adds up to the fact that you can keep a Ford Tractor busy for many extra hours in a year . . . hours when it's saving you time and drudgery, instead of sitting in the shed. You'll see the difference in the greater amount of work that can be done and in the way this tractor can be used to improve farms and increase earning power. Ask your nearby Ford Tractor dealer all about all the ways *you* can use a Ford Tractor, *all year 'round.*

DEARBORN MOTORS CORPORATION • DETROIT 3, MICHIGAN

DEARBORN IMPLEMENTS HELP GET MORE DONE, EVERY SEASON OF THE YEAR

WINTER

SNOW PLOWING—Dearborn Snow Plows and the Ford Tractor make a simple task of keeping lanes and roads clear. Attached by the Dearborn Universal Frame (sold separately). Raised, lowered by Hydraulic Touch Control.

WOOD CUTTING—You can carry the Dearborn Cordwood Saw on the Ford Tractor right to the job, then lower it to solid working position by Ford Hydraulic Touch Control. Belt is always in line.

SPRING

PLOWING—The Ford Tractor is powered to handle a two-bottom, 14-inch moldboard plow, disc plows, middlebusters, 2-way plows, furrowers and sub-soilers. Uniform depth is made easy by Ford Tractor Hydraulic Touch Control.

CULTIVATING—Speed and handling ease of the Ford Tractor make cultivating go quickly, easily. Lift type spring shank, rigid shank with front mounted attachments for either, and listed crop cultivators.

SUMMER

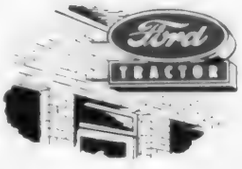
COMBINING—Whatever the crop, whether light or heavy yields, in good or bad conditions, the Dearborn-Wood Bros. Combine can be relied on to cut, thresh and clean efficiently.

MOWING—Take full advantage of good weather. The Dearborn rear attached mower shown here can be attached in 8 minutes; from 25 to 35 acres a day are common. For handling hay or shocked grain, the Dearborn Sweep Rake is tops.

FALL

CORN PICKING—A fast, clean-picking, dependable combination . . . the Ford Tractor and Dearborn-Wood Bros. Corn Picker. Rows from 30"-42" are easily handled. The extra big husking bed adds to picking capacity.

LOADING—The Dearborn Standard Manure and Material Loader is a back and muscle saver. Lifts and lowers by hydraulic power, carries and dumps loads. A heavy duty model is also available.



LOOK FOR THIS SIGN. It identifies your nearby Ford Tractor and Dearborn Farm Equipment dealer. You can depend on him for practical power farming help, for genuine parts and dependable mechanical service. He's a good man to know better.

Dearborn
FARM EQUIPMENT

COPYRIGHT 1948, DEARBORN MOTORS CORPORATION

Ford Farming MEANS LESS WORK . . . MORE INCOME PER ACRE

LOOK AT REYNOLDS *Lifetime* ALUMINUM 5-V CRIMP ROOFING AND SIDING

on this new dairy barn in Michigan

THIS FARMER SAYS: *"It's a barn to be proud of, and year after year I'll be glad I don't have to paint it."*

"Like most modern dairy farmers," says William Bakhaus of Plymouth, Michigan, "I want the best barn I can build. There's extra satisfaction when the most modern building material is so economical, because it lasts longer without maintenance expense."

Concerning aluminum's radiant heat reflectivity, this farmer says: "I could tell how aluminum takes off the sun load when the barn was half roofed. Just walking under the covered half, I could feel the drop in temperature." When winter comes, he will also find that his aluminum barn stays warmer—with the inside heat reflected back from roof and walls.

Add fire resistance to the enduring beauty of *rustproof* aluminum, consider the fact that rats and termites can't get through it, and you have what's best for *your* farm building. Ask your dealer for Reynolds *Lifetime* Aluminum. Write for literature.

REYNOLDS METALS COMPANY
Building Products Division
2027 So. Ninth St., Louisville 1, Ky.

NEW! STIPPLED-EMBOSSED 5-V CRIMP, CORRUGATED, WEATHERBOARD SIDING . . . ALSO GUTTERS & DOWNSPOUTS

Reynolds exclusive stipple-embossing adds rigidity, diffuses light. See this new texture at your dealer's. Remember Reynolds *Lifetime* Aluminum gutters are about half the price of other rustproof materials. Choice of half-round or O.G. style, embossed—also half-round plain.

WORLD'S LARGEST PRODUCER OF ALUMINUM BUILDING PRODUCTS

Corrugated and 5-V Crimp, Snap-Seal Roofing, Weatherboard Siding, Built-Up Roofing, Nails, Gutters, Windows, Reflective Insulation, the "Alumi-Drome" (prefabricated utility building).

Reynolds Pioneering made Aluminum Competitive . . . take advantage of it!

in grain-saving capacity...

in economy and speed of harvest...

that's JOHN DEERE COMBINE *reliability*

THE great line of John Deere Combines towers above the field in everything that counts in combine value. The ability of these combines to save more grain in any combineable crop . . . their exceptionally low per-bushel harvest cost . . . and their greater field dependability result in shorter, more profitable harvests.

Bigger capacity in cutting, threshing, separating, and cleaning units, *plus strength* and plenty of it, are the big reasons why John Deere Combines lead the field in harvesting *more acres per day* and *saving more bushels per acre.*

Cutting a full six-foot swath, the John Deere No. 12-A Straight-Through, Full-Width Combine does a remarkable job in all small grain and seed crops. It's the practical, general-purpose combine for smaller-acreage farmers in either straight combining or windrow harvest.

The John Deere No. 55 Twelve-Foot Self-Propelled Combine has taken the lead in the self-propelled field. Its hungry hum as it eats up the acres has proved more profitable for farmers everywhere.

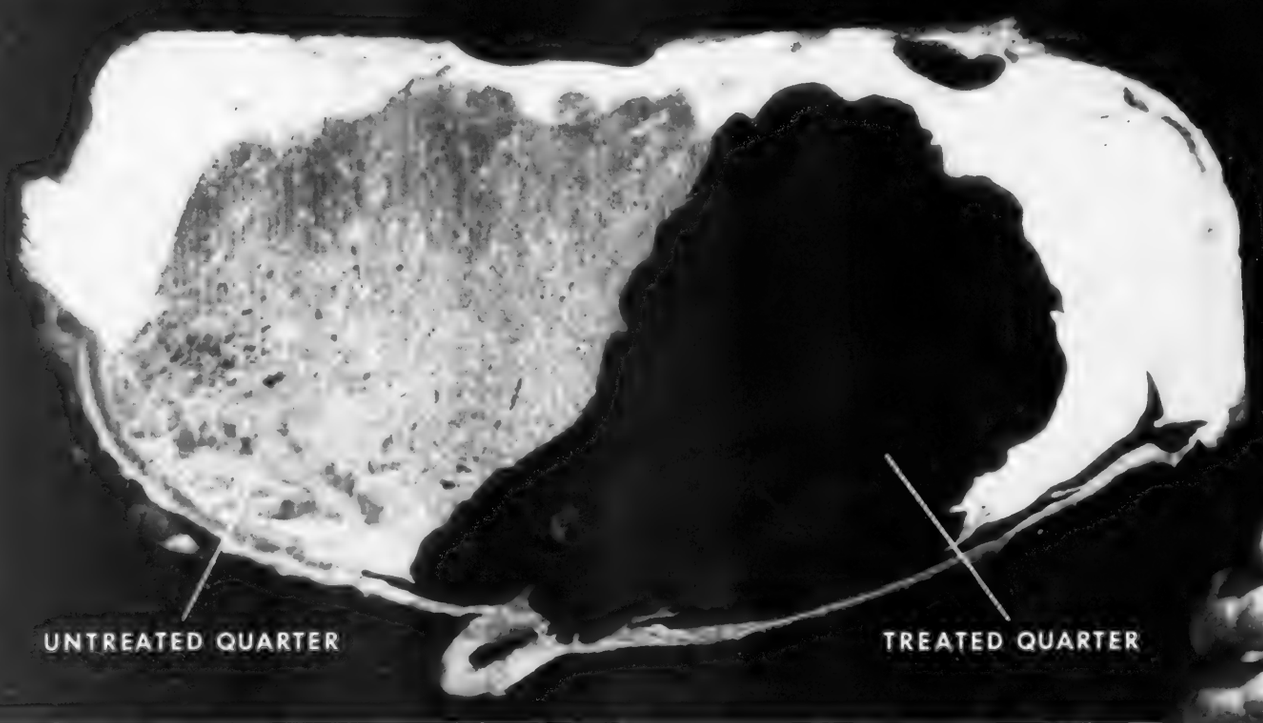
Where big capacity and rugged strength count, the John Deere No. 36 Level Land Combine and the No. 36-B Hillside Combine have been serving large-acreage farmers for three generations.

WHETHER YOU RAISE fifty or several thousand acres of combineable crops, there's a tested *and* proved *John Deere Combine to match your every requirement. See your John Deere dealer about the grain-saving combine you want. You'll find it offers bigger dollar-for-dollar return on your investment.*

JOHN DEERE

MOLINE, ILLINOIS

See for yourself why Squibb "instant-use" Penicillin is so effective for Mastitis*!



Note the dispersion of SQUIBB OINTMENT throughout the treated quarter!

A simple experiment, results of which are shown in this unretouched photograph, demonstrates how thoroughly treatment with Squibb Ointment disperses penicillin throughout a cow's quarter.

One quarter-ounce tube of Squibb Ointment, carrying a dye, was instilled into one quarter of a cow's udder. When the cow was killed 17 hours later, the udder was removed and frozen.

The above cross-section photograph was then taken. You can see from the blue dye how the ointment dispersed throughout the treated quarter, even to the uppermost regions.

The reason for this thorough dispersion is that the ointment has the proper melting point and floats up through the milk in the udder—one of the important factors in making Squibb Penicillin Calcium Ointment especially effective in treating mastitis*. 2 tubes are sufficient for most cases.

See your druggist now—and get Squibb "instant-use" Penicillin Calcium Ointment. Keep a supply on hand! *For accurate diagnosis of mastitis, call your veterinarian.*

*Due to *Streptococcus agalactiae,* the cause of the largest percentage of all mastitis cases.

FREE BREEDING CHART!

Handy—valuable for keeping breeding and freshening records. Write for yours—and for booklet on Mastitis Control. Address E. R. Squibb & Sons, *Veterinary and Animal Feeding Products Division,* Dept. FQ-S, 745 Fifth Avenue, New York 22, N. Y.

SQUIBB — A NAME YOU CAN TRUST

pick equipment you won't have to pamper

NEW IDEA

SPECIALIZED HAYING MACHINES

Measured by actual performance under every field condition, these top-scoring NEW IDEA Haying Machines will serve you better, *longer*. Here's how and why:

THE NEW IDEA MOWER: Following every ground contour . . . through heaviest growths of tough or juicy crops . . . the sturdy NEW IDEA Mower keeps cutting smoothly and steadily. It's completely self-contained, completely protected against damaging impact — completely designed to give you the *most* mower for your money.

THE NEW IDEA RAKE: On stony land or smooth . . . from windrowing tenderest hay to digging out peanuts . . . the NEW IDEA 4-Bar Side Rake has proved equally capable. Rigid, shock-proof construction; flexible spiral reel; greater bearing capacity; patented double-curved, quickly detachable teeth — are just a few of many advantages combined in this advanced tractor rake.

Make your equipment dollars do fullest duty. Make a point of asking your local dealer about these and other extra-value NEW IDEA machines . . . soon. Mail coupon for free illustrated folders.

NEW IDEA

Division — AVCO Mfg. Corporation

Dept. 386, Coldwater, Ohio

NEW IDEA Division — AVCO Mfg. Corporation
Dept. 386, Coldwater, Ohio

Send free descriptive literature on machines checked:

- ☐ Manure Spreaders
- ☐ Wagons
- ☐ Tractor Mowers
- ☐ Corn Pickers
- ☐ Husker-Shredders
- ☐ Portable Elevators
- ☐ Transplanters
- ☐ 4-Bar Tractor Rakes
- ☐ Hay Loaders
- ☐ Corn Snappers
- ☐ Hand Shellers

NAME_____

ADDRESS_____

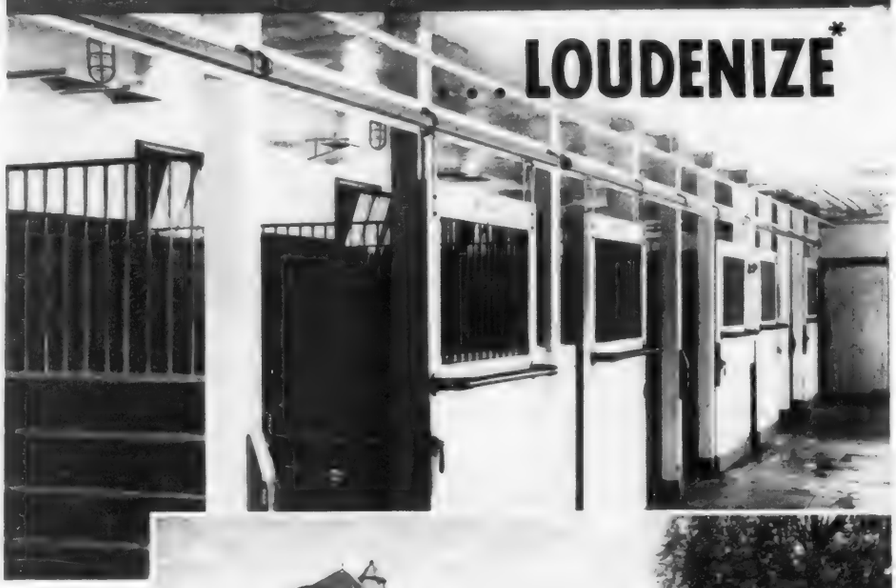
NEW IDEA Tractor Mower: **Rugged, responsive, dependable. Quick, easy hitch. Turns square corners. Self-contained power lift for cutter bar. For all tractors with standard A.S.A.E. take-off and draw bar. Many exclusive features.**

NEW IDEA 4-Bar Side Delivery Rake: **Specially built to suit tractor speeds — doesn't batter hay. Reversible for tedding. Makes a fast, clean sweep of toughest hay fields. Builds tall, fast-drying windrows. Readily adjustable.**

NEW IDEA Cylinder-Pushbar Loader: **Most adaptable loader ever made. Builds big, high loads quickly and easily. Saves leaves and short pieces. Light in draft. Direct-action cylinder, yielding closed deck. Durably constructed.**

THE BEST WAY TO INVEST TODAY'S FARM DOLLAR...

...LOUDENIZE*



*to modernize with LOUDEN equipment

VENTILATION

IRON CLAW FORK

FEED TROUGHS

COW, CALF, BULL & HOG PENS

WATER BOWLS

STALLS AND STANCHIONS

HAY TOOLS

LOUDEN
LITTER CARS

DOOR TRACK

If it's Horse Stable Equipment you need—for blooded stock or work horses—your Louden dealer is the man to see. He can help you LOUDENIZE—the best way to invest today's farm dollar.

From coast to coast Louden box and tie stalls—feed mangers—stall guards—horse fountains—and other horse stable accessories—give constant proof of the superiority of Louden design. They contribute to greater horse comfort, assist in reducing veterinary expense, and give you a stable you will be proud to show. You'll also find this same superiority in all Barn Equipment bearing the Louden name.

Louden established the Barn Equipment industry with the introduction of the first Hay Carrier in 1867. Since then Louden has led the industry in the development of "firsts"—including Litter Carriers, Automatic Water Bowls. Latest addition to the Louden Line is the "Hi-Dri" Hay Drier, the first *complete* prefabricated unit for safe mow-curing of hay.

There never was a time when Loudenizing your barn would pay greater dividends—or cost less in farm products. Year after year, your Louden equipment will improve the appearance of your barn while saving you time—labor—feed—MAKING YOU MORE MONEY.

When modernizing your farm service buildings—or designing new ones—ask for assistance from the Louden Agricultural Engineering Department through your nearby Louden dealer. If you don't know his name, write us.

THE LOUDEN MACHINERY COMPANY

Fairfield, Iowa — Albany, N. Y.

LOUDEN BARN EQUIPMENT

The Dairy Barn

A BRIEF SUMMARY OF THE NEWEST DEVELOPMENTS IN DAIRYING AND THE CARE OF DAIRY CATTLE.

Cross Breeding Two years ago (Summer 1947 issue) *Farm Quarterly* published a progress report on the U. S. Department of Agriculture's cross-breeding experiments with dairy cows, known in some circles as the Beltsville "Hot Potato." As might be expected, however, the USDA did not halt its experiments with the appearance of the *Farm Quarterly* article. It is still in full stride and during the past two years there have been some interesting developments. Recent information coming from the USDA permits us to bring this picture up to date.

For the benefit of those who came in after the show started, here is a brief resume of what went before. The cross-breeding experiment started more than 10 years ago as a result of farmers' questions on the subject. The research men wanted to know, (1) if dairymen could get better milk producers by cross-breeding, (2) what program they should follow in any cross-breeding they attempted. During the experiment purebred sires have been used in all matings. The original cows were purebred Jerseys, Holsteins, Guernseys, and Red Danes. They were first bred to purebred bulls of other breeds. The resulting two breed females were raised and in turn bred to still a third breed of bull. It is this last group, the three-breed cows, that has come into production within the past two years.

The first 52 cross-bred cows, which were combinations of two breeds, had an average increase over their purebred dams of 2,815 pounds of milk and 143 pounds of butterfat. Forty-three of the 52 cows produced more milk than their purebred dams while 49 produced more butterfat. When their female offspring were bred to a proved bull of a third breed, production continued to climb. There were 31 three-breed cows averaging 13,348 pounds of milk and 617 pounds of butterfat. This was an average increase over their two-breed dams of 178 pounds of milk and 12 pounds of butterfat per cow.

Farmers who own mixed herds, or high grade cows may want to make use of these findings. They can breed their cows to the highest producing bulls in their artificial insemination ring regardless of breed and take advantage of the hybrid vigor and resulting extra production.

Hardware Troubles Cows don't know how to spit. If their alfalfa hay contains a six-inch piece of rusty bailing wire, junior's pocket knife

It Costs You Less to Make Good Hay with CASE

THE BALER MOST ANY FARMER CAN AFFORD TO OWN

he Case tractor side-rake has a 4-bar reel, geared . It handles hay gently, builds high, fluffy windrows ast tractor speeds — promotes quick, even curing. lable in both standard and heavy-duty roller-bearing ls. The Case Trailer-Mower, shown at top, hitches ly to most any modern tractor. There are also nted mowers for Case tractors.

he Case Forage Harvester is simple and fast, built the beginning for *both* standing corn or other silage crops and windrowed hay — either green for silage red for barn storage. It also chops and loads com- straw for bedding. Easy on power, it makes the of tractor capacity, hustles the harvest of any forage green or dry.

● The big thing in hay quality is TIMING. With your own Case Slicer-Baler you can start baling at the very hour your hay is at its peak, before sun-bleach steals color and vitamins, before over-curing causes leaves to shatter. Every hour you gain cuts down the risk of damage by rain or dew.

The Case Slicer-Baler is used by more farmers than any other. It is so moderate in price that most any farmer can afford his own. It is free from complicated mechanism — so simple that boys operate it. Years of use have proved it so sturdy that it takes very little upkeep. From hay on the ground to bales on the wagon it requires but little labor. You save on everything — money, time, labor and feeding values.

With a Case Slicer-Baler you get firm, neat bales of uniform size. It uses the standard wire tie—proof against weather, insects, rough handling and long hauls. The bales open up into portions like sliced bread, easy to feed without knocking off leaves.

Now equipped with new feed auger, this low-cost baler works fast in all crops. It handles windrows from 7-foot swaths at the same speed as tractor mower and rake. It "stays in step," to give you uniformity of curing — to put up ALL your hay at its prime.

Quality in hay pays big rewards — by milk in the pail, by finish on growing animals, by savings of grain and protein concentrates. Plan now to get these gains by putting up your hay the prompt, low-cost way — the Case System of three simple steps made easy with a Case Slicer-Baler.

Look in on Your Case Dealer

See him at headquarters for advanced farm practices, marked by this sign of the 77 modern farm machines and of first-class dealer service. Ask him or write us for free booklet "How to Make High-Protein Hay." For catalog or folders, mention any size of tractor, any kind of haying or harvesting machine, plow or harrow, planter or grain drill, cultivator, spreader, corn picker or binder, hammer mill or farm truck you may need. Address Dept. 90-C, J. I. Case Co., Racine, Wis.

penta- treat your posts!

chlorophenol

STOP UNNECESSARY LOSSES—BUILD WITH "PENTA"-TREATED WOOD

Replacing fence posts takes time—time that can more profitably be spent doing productive farm chores.

Reduce *unnecessary* labor and save valuable work time! Treat your posts and other lumber with PENTACHLOROPHENOL—the chemical preservative that protects wood from termites and decay. Penta-treated posts last two to four times longer, and you can treat them simply and cheaply right on your own farm.

Start today to make all your work-time "Profit" time!

1. "Penta"-treated posts last longer.
2. It's economical to treat with Pentachlorophenol.
3. The "Penta" treatment leaves wood clean and easy to handle.

or a rusty finishing nail, they will likely chew contentedly for a few minutes then swallow.

Cows have been known to swallow such items as metal tacks, pocket watches, nails, needles and broken glass. Usually these items of hardware reach the second stomach before they damage the animal. There they may pierce the stomach walls. If the object is sharp it will usually move toward the heart, because of the breathing actions and muscular contractions. Objects may however take other courses, and in rare cases have been known to work themselves to the surface of the animal's body. If the object actually reaches the heart

and penetrates the heart tissues infection usually sets in and the cow will die.

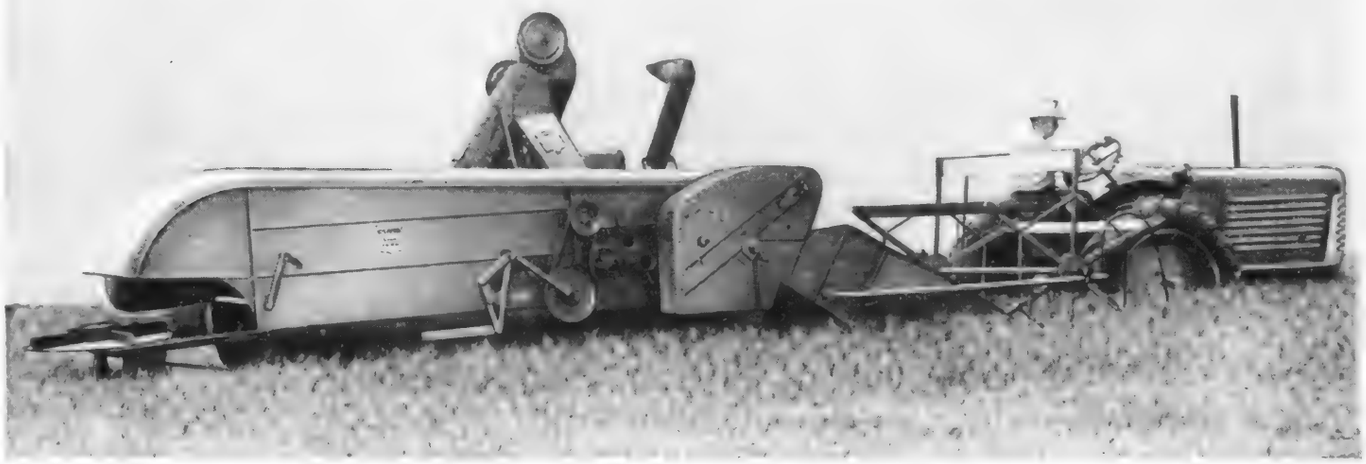
In some cases the cause of the trouble may come to light only on post mortem examination. The cow may however, display digestive disturbances which are reflected in her eating habits. She may keep her back arched and want to stand around all day in one spot. If she suffers much she may stretch her head forward and grunt occasionally. Breathing is short and difficult. Pulse is rapid. In advanced cases frictional heart sounds may be heard at several yards. There may also be a gurgling or splashing sound because of liquids that collect around the heart. After the first symptoms occur the cow may continue to drop off physically for several weeks. Recovery is rare.

It is little comfort to the farmer to know what the trouble is unless he knows what to do about it. In the early stages surgery by a veterinarian may save the animal. Medicines are of little value. Where a major operation cannot be performed the best course is to slaughter the animal as soon as the trouble is diagnosed.

Prevention is everything in hardware troubles. After fixing fences, gather up all stray staples, bits of wire and nails and put them where they won't tempt valuable animals. When filling the silo take care to see that no stray objects get into the feed. In several cases dairymen have cleared up hardware troubles in their herds by constant inspection of loafing barns, feed lots and pastures for loose metal objects. It isn't safe to feel that bossy won't touch these objects because they're not tasty. With customary perverseness, she may pick them up as tidbits only to die for her trouble. ★ ★ ★

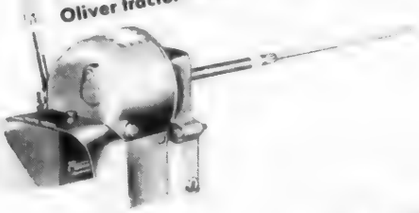
two ways to make your harvest hum

..Smoother ..steadier!



Direct Drive Power Take-Off

Steps up the performance of PTO-driven machines. Driven directly from engine, independent of transmission clutch. Equipped with separate clutch, controlled by lever near tractor seat. No more breaks in PTO power by transmission clutch disengagement, gear shifting or travel stops. Standard equipment on the new Oliver tractor line at no extra cost.



Here's a new crop-saving combination to hustle along your harvest . . . profitably!

One . . . the compact, big-capacity Model 15 Grain Master. Its scoop-type header takes a full 6-foot swath. From sickle to cleaning sieve, the Model 15 is packed with improvements winnowed from 100 years of experience in building fine threshing machinery.

Number *two* . . . Oliver now offers a convenient Direct Drive Power Take-Off as standard tractor equipment. Coupled with the six forward speeds of the new 6-cylinder Oliver Row Crop "77", this modern Oliver advancement brings you greater combining efficiency and smoothness than you've ever before attained.

Stop at the sign of the Oliver shield soon and check the many *farm-utility* features found in the new Oliver tractor fleet . . . and in Oliver harvesting equipment.

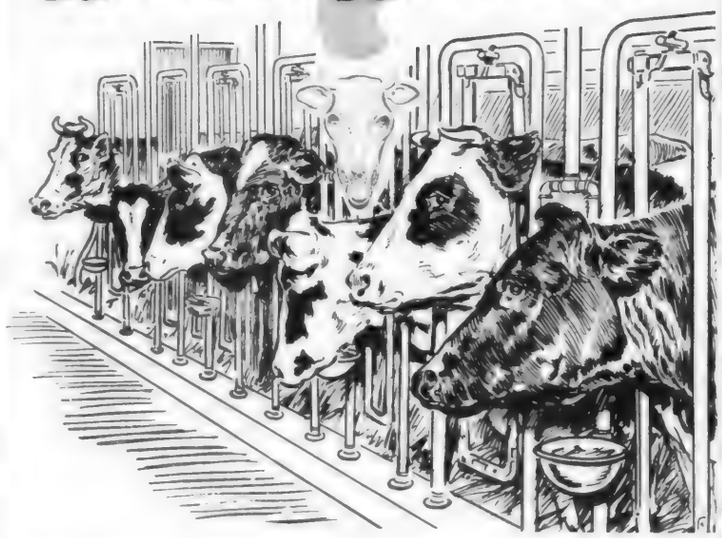
The OLIVER Corporation
400 West Madison Street, Chicago 6, Illinois

THE OLIVER CORPORATION

OLIVER

"FINEST IN FARM MACHINERY"

Which ONE is marked for "HIDDEN HUNGER"



Sure, they *all* may be deep bodied, healthy producers and reproducers *today*. But . . . will they continue to be next month—next year? Or, will one, or *more*, be marked by:

"HIDDEN HUNGER"—*Lack of essential mineral elements needed by livestock for sturdy health, rapid growth, peak production and reproduction.*

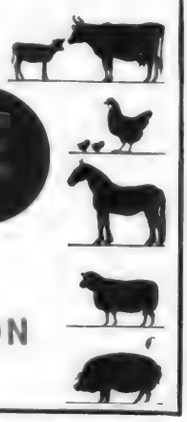
Don't take a chance with future stock health or *your profits*. Feed Near's MinRaltone daily, throughout the year. It protects stock against "Hidden Hunger" because it supplies 11 essential mineral elements (plus Vitamin D) which may be lacking in the daily ration. Write for free literature which tells all about the 3 WAYS to feed MinRaltone year round.

NEAR'S FOOD COMPANY, INC. Established 1899 **BINGHAMTON, N. Y.**

3 WAYS TO FEED MINRALTONE *year round*

NEAR'S

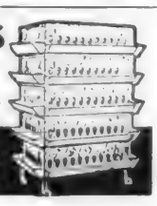
MINRALTONE



MINERAL FEED SUPPLEMENT

for **HEALTH**
PRODUCTION
PROFITS

2 LB. BROILERS IN 8 WEEKS
WRITE TODAY FOR COMPLETE INFORMATION
AND FACTORY-TO-YOU, MONEY SAVING PRICES
CHEWALLA SANITARY BROODER MFG. CO. HOLLY SPRINGS, MISSISSIPPI



CHEWALLA *Sanitary* **BROODER**

FARM BOOKS

Life In The Soil

Farmers of 40 Centuries, by F. H. King; Rodale Press, Emmaus, Pa. $5.00.

Indulging in the fascinating pastime of selecting the 100 best books on farming, for *Previews' Farm and Ranch Yearbook,* Dr. Firman E. Bear, Professor of Agricultural Chemistry at Rutgers University and author of *"Soils and Fertilizers,"* listed Dr. F. H. King's book, *"Farmers of 40 Centuries,"* as the best work on life in the soil. In listing this book, Dr. Bear noted that it might be hard to acquire but would "reward the reader well for his search." This scarcity no longer exists since the book, which was originally published in England, has recently been reissued in an American edition.

"Farmers of 40 Centuries" is the result of a trip through China, Japan and Korea made by Dr. King to study the agricultural methods used by these people to keep up their intensive agriculture without materially depleating their soil. The Orientals carefully return human wastes to the soil, a practice that disgusts Westerners. The return of 182,000,000 tons annually of night soil is only a small part of their soil building practice. They also dredge their rivers and canals to secure the soft mud and silt which they apply to their fields at the rate of 70 to 100 tons to the acre; they turn under every blade of grass or wisp of straw; return the wood ashes from their fire places; and spread the droppings and molted skins of the silk worms on the mulberry orchards. Without chemical fertilizers this is the only way they are able to keep up an agriculture that produces three and four crops a year and permits them to overlap crops on the same plot to the point where they may have wheat being harvested at the time windsor beans are maturing and cotton is just beginning its growth.

Dr. King, who was, before his death, onetime Chief of the Division of Soil Management for the U. S. Department of Agriculture, wrote his book with the simplicity of a travelogue. He manages to give the feeling of the Orient with its fabulous supply of manpower and its penurious thrift as well as the agricultural practices that sustain it.

The book is by no means a "how to do it" description, but, rather, a stimulant to those of us who think entirely in terms of our own agriculture. Some may feel that the book may be out of date, since it was written in 1909, but the slow pace of life in the Orient has changed conditions very little in the last 40 years.

(Continued on page 87)

This picture gives you the driver's-eye view, operating the new rear-engine Model G tractor.

Your eye follows the oncoming rows clearly and easily. You have *straight-ahead* vision, instead of looking down or behind.

Equipped with a new front-mounted, low-set 2-row drill planter (or a multiple-row planter for soybeans and narrow-row crops) the Model G is the ideal self-powered planter.

Any one of 10 front-view Model G Matched Tools can be attached or detached in 5 minutes or less. The tractor wheels can be spaced for planting or cultivating 1 to 6 rows. Speeds range from ¾ to 7 miles per hour, including a special low creeper gear.

This is the tractor to replace that last team of horses. It operates on 2 to 3 quarts of fuel per hour, far thriftier than feeding a team the year 'round.

More than a new tractor, the rear-engine Model G is the central unit of a new system of motorized farm tools.

MODEL G *Rear Engine* **TRACTOR**

for some jobs on ALL farms
for ALL jobs on some farms

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

ORA CROWLEY, born on the Prairie, has watched cash grain farming push out the prairie chickens and the grasses. On the farm which he owns with a brother he points out a field which has been in cash crops for sixty-six successive years. It made 70 bushels of corn to the acre last year.

THE GRAND PRAIRIE

BY JAMES S. AYARS

On the Rolling Prairies of Illinois where once the Buffalo roamed and the Prairie Dock and Bluestem waved in the wind, endless Fields of Corn and Soybeans march to the Horizons.

WHERE you see the red corn crib with its cupola atop, where you see the grain elevator, that skyscraper of the crossroads hamlet, there you see the Grand Prairie. These are its trade marks. These are the signs of its wealth and the monuments to the hard work of its people.

In a great crudely shaped crescent that was marked out by the southern extension of the early Wisconsin ice sheet, the Grand Prairie stretches from west central Indiana northwestward into Illinois to the Illinois River valley, and then northeastward toward Lake Michigan. It shows no respect for county lines, cutting across them at will, but nineteen Illinois counties lie wholly or chiefly in this Prairie area.

This Prairie sees its wealth, in corn and soybeans, go out over the straight ribbons of concrete and steel that crisscross it, and come back as automobiles and tractors, radios, nylon hose, and grapefruit. Its economy is cash grain. In a land where corn and bean fields crowd each other to the horizons, there are few hogs and fewer cattle.

Here you will find none of the intimate friendliness of New England valleys; none of the vivid green of alfalfa and clover of Wisconsin dairy pastures, nor the naked monotony of western plains. It is not a beautiful land, except to those who see beauty in rich, black earth and in the repetition of corn and soybeans, corn and soybeans, stretching along the highways as far as the eye can reach. But the traveler will see at once that it is a rich land, for the black earth is everywhere, and the ears of yellow corn burst from their husks and the soybeans grow hip-high and lush. Because of its soil, some call it the Black Prairie.

The people of the Grand Prairie are a product of its monotonous landscapes—serious, hard-working and machine-minded. Many of them have no deep love for the Prairie, no great joy in farming as a way of life. They tolerate it because its returns are rich and many of them look forward to the day when their accumulated cash will buy a home in town, or a farm "back home in Indiana."

Where the Buffalo Roamed

Broadlands and Flatville are typical names on the map. But the level land is cut here and there by low ridges, moraines left by the glacier. Black clay and brown silt loam lie between these ridges where groves of trees once grew.

The most fertile land area in Illinois, it was the last settled; the most productive area in Illinois, it has the highest rate of tenancy; and the most prodigal in its giving, it is apparently one of the areas least loved. One might call it the Paradoxical Prairie.

Although the term *prairie* came from a French word meaning *meadow tract,* traveler Frederick Gerhard wrote in 1857, "Those who have not seen a prairie should not imagine it is like a cultivated meadow, but rather as a heaving sea of tall herbs and plants, decking it with every variety of color."

Although most early settlers were too busy breaking sod to write down descriptions of the Prairie, one at least dug back in his memory to the day when, as a boy of ten, he came to Illinois with his elder brother, who "geed" and "hawed" the ox team that hauled them and their belongings. As a man of eighty, William A. Conkey wrote: "The first nine miles of the road were through timber, when we struck the Grand Prairie, as it was then called. The grass waving in the beautiful sunlight of June and all the wild flowers of the Prairie bowing their heads to the breeze, presented a sight that I thought the most beautiful I had ever beheld, the remembrance of which, notwithstanding seventy years have passed and gone since then, is still as vivid to my mind, it seems, as the day when I first viewed the beauties of the grand old prairies of Illinois."

How Came the Prairie?

How this Prairie came to be, how any prairie came to be, has challenged speculation since explorers first beheld the wide, undulating seas of grass.

The feeding and trampling of millions of bison were thought by some settlers to be the cause of the scarcity of trees on the

prairies. The vast annual fires of the prairie grasses were thought by others to be an adequate explanation. But something else seemed needed to explain why certain grasses and coarse herbs were dominant in one region and forests in another.

Dr. Edgar N. Transeau, an Ohio man, has the best explanation for the Grand Prairie. He saw that, over most of the United States, the rate of evaporation was greater than the rate of precipitation. We might compare it to a crock partly filled with water which is exposed to the air. Even though the crock catches all the rain falling its way, at the end of a year, the crock will have less water than it had at the beginning.

Where the rainfall is 20 to 60 per cent of the amount of water that would evaporate if exposed to the air, and not absorbed by the soil and plants, Dr. Transeau found the plains or short grass prairies; where the rainfall is 80 to 100 per cent, he found forested regions; where the rainfall is 60 to 80 per cent of the possible evaporation, he found the long grass prairies, the region of the Grand Prairie.

Last Choice Homesteads

Common among early settlers was a belief that land that did not grow trees would not grow good crops. In addition, if there was no timber there was no lumber for buildings, fences and the fireplace. Before 1850 many a Conestoga lumbered over the black rutted roads of the Grand Prairie on the way to "richer" land farther west.

Henry Sadorus, so tradition goes, in 1824 became the reluctant first settler in Champaign County, among the richest on the Grand Prairie, when one of his oxen died and he could go no farther on his way westward. Henry squatted on the land for ten years before he decided to pay the Federal Government $200 for a quarter section, 160 acres.

Another reason for slow settlement of the region was that much of the land was under water in spring, and needed draining before it could be cultivated. The Prairie sod was tough and generally required two or three seasons of muscle and sweat before it would grow good crops. Fever and ague were common.

The early settler needed easy access to water—water to quench the thirst of his family, his horses, and his cattle; water to turn the wheels of his grist mill and his saw mill; water to carry his grain and salt meat to market. And since the Grand Prairie is a relatively level watershed, most of the streams are sluggish ditches, too few in number and too small to supply the needs of a civilization that still built its homes facing water that flowed.

Although Illinois had become a state in 1818, thirty-two years later only about 119,000 persons—less than one-seventh of the population—lived on the more than 7,000,000 acres of the Prairie.

Then the railroads came. In 1851 the State Legislature incorporated the Illinois Central Railroad Company with a grant of 2,595,000 acres of public lands. Two lines cut through the Grand Prairie, the "main" line down through the center of the state from north to south, and a "branch" line from Chicago to Centralia.

With the unrestrained enthusiasm of an infant corporation with a couple of million acres to sell, the Illinois Central published a series of booklets designed to entice eastern settlers to the prairies. From the 1856 booklet comes this description:

"The soil is a dark, rich vegetable mould, varying from two to eight feet in depth, capable of producing anything in the greatest profusion, which will grow in these latitudes at all, and absolutely inexhaustible in its fertility."

In the same booklet, a testimonial letter written by John Williams of New Albany, Coles County, to the United States Land Commissioner, painted the virtues of the Prairie in glowing prose: "I can raise on my farm, and have done it, 60 to 100 bushels of corn to the acre, 30 to 40 bushels of wheat per acre, and every kind of vegetable in abundance. I will say, sir, that in Coles, Champaign, Vermilion, Moultrie, and the adjoining counties, are as good land as the sun shines on; the soil is rich and deep, timber first rate; water fine and sweet; health as good as anywhere in the states; and if a man can't come here and clean the whole cost of his land, improvements and all expenses, from two to three crops, he ought to be hooted out of the State as not fit to be called a farmer."

In the ten years from 1850 to 1860 the population of the Grand Prairie more than doubled. Land that for years had been offered by the Federal Government at 62½

PRAIRIE PIONEERS found comfort in the Bible. Its bright promises held them steadfast in the unending toil of making a new home. Today only a few churches survive; some are used for storing the great crops of corn; some shelter the combine over the winter.

←

MRS. LOU CROWLEY is a product of the Grand Prairie, serious minded, God fearing, and hard working. There was not much gaiety on the Prairie when Mrs. Crowley was a girl. Life is easier now, for the radio and the automobile have pulled the cities closer.

PRAIRIE FARM BUILDINGS were designed strictly for the business of producing and storing a crop. Severe and practical, Prairie builders put up a box-like house, a corncrib with a cupola, a small barn for the horses, and an outhouse. The cupola is not decorative—it is a ventilator, and an entry way for corn from the elevator.

cents to $1.25 an acre with few takers was sold by the Illinois Central in 1856 at $5 to $25 an acre.

When you drive through this region of clean fence rows today it is difficult to imagine how it looked when the first settlers saw it. They used to tell stories of hunts for the cattle in the fall. The native grasses grew 6 to 8 feet tall and the only way the cattle could be seen was by the waving of the grass as they pushed through it. One of the tallest and most abundant of the grasses was the big bluestem, dominant on the original Prairie. Now it is gone except for small patches that are allowed to grow as a curiosity along railroad rights of way. With the big bluestem has gone the Prairie dock, a plant of coarse, heart-shaped leaves growing close to the ground and small yellow flowers waving in the breeze at the end of an ungainly tall and slender stem. With the tall grass has gone the shorter yellow-flowered compass plant, whose coarse saw-toothed leaves were said by settlers to mark the directions.

With the tall grass and the regal gold and purple flowers have gone the Prairie chickens, once so numerous that William Cullen Bryant, who saw them on a stage-coach journey to Illinois relatives before 1850 wrote, "In some neighborhoods they seem almost as numerous as fowls in a poultry-yard. A settler goes out with his gun, and in a quarter of an hour brings in a half dozen birds which in the New York market would cost two dollars a pair." The Prairie chickens have followed the deer, the beaver, and the bison out of the Grand Prairie.

In their places are corn and soybeans, and that undeniable trade mark of the Prairie, the red corncrib with its inevitable cupola. And along the railroad tracks, the grain elevators point skyward. Where 10,000 working oxen drew the Prairie sod busters in 1850 are more than 50,000 tractors. The Prairie has gone mechanical and efficient and coldly productive.

The Good Black Earth

With less than a quarter of the Illinois farm land, the Prairie produces nearly a third of the total value of Illinois crops. It produces 35 per cent of the Illinois corn. Introduced early to the soybean by the Illinois Agricultural Experiment Station in its midst, it produces about a quarter of the nation's crop. It is the soybean center of the world.

But the Grand Prairie grows comparatively few cattle, hogs and sheep, and that lack is partly responsible for some of its

problems. The riches of the soil are hauled off as grain; little is returned except what goes in as commercial fertilizer. There are occasional gestures of conservation when clover fields are plowed under as green manure, but by and large the soil is being mined. Once it seemed inexhaustible; but now it packs under the rains because the humus is gone, and larger and larger doses of fertilizer are needed to keep up its production.

In a land of corn, why so few hogs and cattle? Geology and geography, a fertile land near a ready market, help to explain this paradox. While farmers far distant from markets are forced by high transportation costs to sell their grain in concentrated form, enclosed in cowhide or pigskin, farmers of the Prairie can sell their crops in Chicago, the greatest cereal market in the United States, only a short haul away.

Guy Wilson of St. Joseph says, "The farmers in this county raise corn and get the money out of it. Let the other fellow feed it and take the risk."

"When we sell the grain, we make more money with less help," says Lowell Hissong of Mayview. "It's hard to get help."

The returns from grain farming increased as prices climbed and the hybrids came in. By 1920 the value of land and buildings on the Prairie rose to a high that had never before been equaled; an average of $302.39 per acre, higher than the average for any Iowa county in the same year of high prices. After a considerable dip in 1934 and 1935, land prices in the Grand Prairie began climbing again. To the dismay of farm economists if not to all farmers, land prices have continued to climb until today they are perilously close to or above the stiff 1920 level. Farm acres are now close to suburban building lot prices. At a recent land sale to settle an estate, five farms in DeWitt and Piatt counties totaling 680 acres sold for $309,480, an average of $454.41 an acre. One of the farms of 160 acres was sold for $79,640, an average of almost $500 an acre.

These high land prices themselves pose one of the problems of the Prairie. The Prairie's fertile land is often regarded as a commodity for speculation or as gilt-edge high income property, rather than as soil to be lived on and loved.

THE BROWN FAMILY, of Delavan in Tazewell County, is the exception that proves the rule. Five generations of the Brown family have lived in the same large, comfortable farmhouse on the Prairie. Of Pennsylvania Quaker stock, the Browns have found the time and the means to live well, laugh a great deal, and enjoy life on their 500 acre farm.

WHEN THE BEAN HARVEST is on, Grand Prairie elevators are open far into the night.

THE BLACK SOIL of the Prairie is measured in feet. The rotation is corn and soybeans.

High priced land is responsible for a high rate of tenancy. In 1945, when only 34 per cent of all other farmers in Illinois were tenants, 52 per cent of the farmers on the Prairie worked land owned by someone else.

With tenancy, even on the fertile soil of the Prairie, are many of the evils of tenancy elsewhere—a partiality toward the cash crop system with soil sapping rotations and consequent erosion by water and wind. Land that is not loved does not last. It washes away, down to the rivers. It loses quality— tilth. Continuous planting of corn, most profitable of Prairie crops and therefore dominant in the tenant farming system, results in loss of that moisture and mineral retaining humus that made the black soil one of the world's best seedbeds.

"This land is being robbed of humus," says Garrett Baker, Urbana banker, who owns two Champaign County farms. "I preach livestock to my farmer friends as a way of keeping humus in the soil and returning to it the elements we take out with our crops. But most of my friends say, 'This land is too valuable to raise livestock on.' I can't see it that way.

"No question about it." Banker Garrett Baker is emphatic. "The corn-soybean rotation is hard on the land. But you can't find the livestock men. Most of these grain farmers don't have to work all year round. The average grain farmer works only five to seven months a year, and some of them take vacations in Florida or California.

"When we took over the place east of here in 1927, the land was only yielding 40 bushels of corn, 30 bushels of oats to the acre. Corn and oats, corn and oats, corn and oats—that was the rotation. Taking everything out of the soil and putting nothing back. So I made a deal with a livestock man. He was really a good livestock man. We went into purebred livestock—Brown Swiss. We might have gone into beef cattle and done just as well. Anyway, it wasn't long before we were producing 60 to 75 bushels of corn. Last year we made 100 bushels of Clinton oats per acre in one field, and this year 100 bushels of corn in the same field. It's just a small tract, but it shows you what this land will do when it's handled right. Farming is like keeping a bank account. You've got to replace what you take out."

Many tenant farmers know good farming, and see disaster ahead unless rotations are changed.

"It isn't right!" Charles Schweighardt says of the corn and soybean cash crop system. He lives on rented land west of Pesotum and runs a farm of his own up the road. "The fellows that sandwich clover into the rotation and use lime and phosphate are showing the way to better yields and longer life of the land. I know a couple of farmers not far from here who built their land up until they're getting 117 and 127 bushels of corn per acre. They say the biggest failure they've had in re-

THE ANACHRONISM of the one-room schoolhouse, many of them within sight of one of the greatest universities in the land, is a commentary on the prevailing tenant system of the Prairie. Salaries are low. This teacher brews her own coffee for lunch.

cent years was 87 bushels. Not many people would consider 87 bushels much of a failure."

Very few sections of this country can support two families on a 160, or even a 200 acre farm. This is not only possible on the Prairie, but it is one of the causes of the high rate of tenancy; for the consistently good yields of corn and soybeans have made it possible for the tenant family on the farm to make a good living and the owner's share of the profits has kept him living comfortably in the city. Take the McCormick family that lives near Mayview. Will McCormick and his wife and two husky sons have lived on the same farm for 20 years. They are the kind of tenants that landlords dream about. If the house needs fixing they do the work. Getting along with few modern conveniences, they have made the farm produce a profit every year. Their own share of the profits has been enough to enable them to buy a farm a few miles to the east across the state line in Indiana.

"Of *course* people know that corn and soybeans will wear out the land!" exclaimed Mrs. Will McCormick, as she started the electric pump outside the kitchen door to get water for cleaning the chicken that was to be roasted for Sunday dinner. "But those are the crops that people think make the most money for them.

"There's money in hogs," she continued. "That's the way we made most of the money to buy our farm over in Indiana. But it takes good buildings to raise hogs right. And some of us can't make our landlords see things that way. They think there's more money in cash crops."

To give the other side of the picture are people like the four Crowley brothers, Lou 64, Dan 73, Ora 69, and Lou's twin, Lee—who stand on a Champaign County hill, once forested, and look out over lowland fields of corn and soybeans.

"See that 30-acre field of corn?" Lou points to the west. "That field was once a glade in the timber; nothing in it but sloughgrass. That corn you see there is its sixty-sixth successive crop. Corn, oats and soybeans—that's what that field has raised all those years. In its sixty-second year, that field averaged 70 bushels of corn to the acre. And it's never had any fertilizer on it."

"I can show you a field about half a mile down the road that hasn't had anything but corn on it for 20 years," says Lowell Hissong. "And it's pretty good corn! Want to see it?"

Although people of the Prairie sometimes like to brag about the fertility of their land, many of them know that yields in general are not as large now as they once were. Most of them know the reasons, but many of them overlook the increased yields of hybrid corn and its drain on fertility. And they know that lime and phosphate and clover and cattle and hogs are soil builders. Most of them would like to preserve or restore the fertility of the soil. But for many of them a combination of circumstances prevents or delays their put-

(Continued on page 142)

FERTILIZER

BY W. E. LYNCH

Farmers know one end of fertilizer, its purchase and application. Here is the other end, its sources, its chemical make-up, and its manufacture.

EVERY farmer ought to have a talk with Jim Littlejohn, my fertilizer man. I've been a happier man since Jim gave me a free lecture on fertilizer one rainy afternoon not long ago. As a dirt farmer who likes to keep up with the times, I don't object much to parting with $200 or $300 of my hard-earned cash every spring for fertilizer, but I've always wanted to know more about it. When I was getting my first lessons in farming, forty years ago, the only fertilizer we used was manure from the stable. I remember well when my father bought his first bag of commercial fertilizer. It was a single 100-pound bag which the seed dealer sold him to try out on his kitchen garden. We had a fine garden that year and the whole family felt very progressive and scientific.

Before we knew what was happening, we were buying several tons for the corn and wheat, and we took it pretty much for granted, for we could see what it was doing for our crops. But I never outgrew my curiosity about the stuff, and why it was needed, what it was made of, and where it came from. The bulletins from the government experiment stations only confused me when I went to them for explanations. They are written in a style either so highly technical or so slow and plodding as to discourage me and usually cause a reaction somewhat like that of the schoolboy who said, after reading a book about penguins, "It's more about penguins than I want to know."

I kept wondering why, out of the score or more of elements a plant uses for food, only three, nitrogen, phosphorus, and potassium, had to be supplied. And I was curious too, about how the fertilizer people arrived at the percentages of each element, and how they knew we needed those proportions. I often wondered how to check the low analysis fertilizers against the super varieties for yields and costs. It seemed to me that there was a lot of guessing going on. I always bought what

the dealers had on hand. This seemed to me to be like shooting in the dark and hoping that the old shotgun would scatter enough to hit something.

All these questions kept spinning around in my head, year after year, until one day Jim Littlejohn was caught at my place by a sudden shower and we sat on a bale of hay in the barn to wait it out. He likes to talk about fertilizer; made quite a study of it at agricultural school. He had been a farmer himself and I understood his talk. He said one of the reasons he started to sell fertilizer was because he wanted to find out the answers to the same questions that were bothering me.

"The whole theory of applying fertilizer," he said, "is that you put back into the ground just about what you take out of it. If you want your corn to grow you have to feed it."

He had a good word to say for the professors. "Dirt farmers often make fun of the professors," he said. "When you meet 'em they can talk about fertilizer and give you a lot of easy-to-understand information. But when they sit down to write about fertilizer—look out. Then they are writing for the other college professors in the country who have their tomahawks all sharpened just ready to jump on some mistake or loosely proved idea. But they're the ones who have done the job of experimenting and if it were not for them manure would still be our only fertilizer today, and there's not nearly enough of that to go 'round."

There was a little more chemistry in Jim's lecture than I liked, and very little farming. But I asked for it, and here it is, dressed up a little to make it easy to follow.

Laboratory to Farm

The professors have discovered that of all the elements in the soil, nitrogen, phosphorus, and potassium are most often lacking in large amounts. Plants need other elements too, usually called secondary and minor elements, but most soils either have enough of these elements, or need them only in small amounts. It's the "Big Three" that we have to supply by the ton every year.

Plants can't use these elements in pure form. Nitrogen, potassium and phosphorus are not only useless to plants in pure form, but two of them are dangerous to handle. Both potassium and phosphorus burst into rapid oxidation when exposed to moisture. Either the fertilizer chemist must combine them with other elements or nature must do it.

The Elusive Nitrogen

Take nitrogen; nitrogen in its pure state is a colorless, odorless gas. Plants won't have anything to do with pure nitrogen. It is very slow in teaming up with other elements. About 80 per cent of the atmosphere is nitrogen.

Most of the fixed nitrogen already in the soil is found in the organic matter. The chief cause of soil decline is loss of organic matter. If the organic matter is low, the nitrogen is low. It varies, per acre in America, from 7000 pounds to the acre at plow depth to as low as 1500 pounds to the acre, which is not enough for a crop, only a little of it is in a form plants can use.

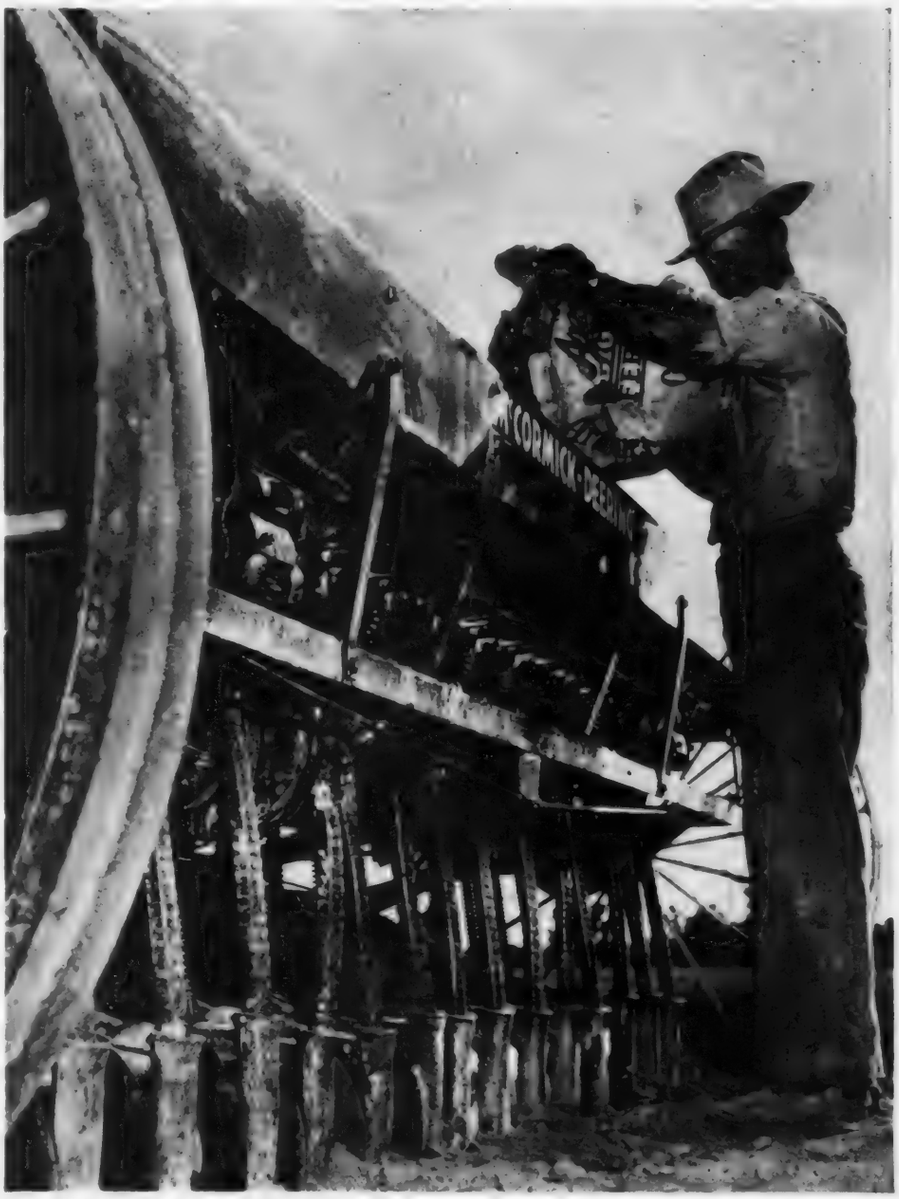
But in the air over an acre of ground there are 35,000 pounds of nitrogen. "As long as we have air we'll never run short of nitrogen," Jim said. And added facetiously, "If we run out of air we won't need nitrogen."

Legumes, like clover and alfalfa, attract soil bacteria which take nitrogen out of the air and deposit it in nodules on the roots, in a form which can be used by plants. (See "The Friendly Bacteria," *Farm Quarterly*, Autumn 1947.) If we plow under the legumes the nitrogen accumulated in the nodules will help supply a following corn or wheat crop. In good soil this amount of nitrogen will supply a corn crop up to 70 bu. per acre. Further increase in yield must come from commercial fertilizer.

There are other natural sources of supply of nitrogen. Bacteria, present in many soils in varying numbers, can take it out of the air by fixation and feed it to plants; rain and snow wash small amounts from the air into the soil; and every time there is a bolt of lightning some of the gaseous nitrogen is "fixed" and drifts to the earth as plant food. These are all strictly small-time sources of supply; the main sources of commercial nitrogen are the fixation factories of fertilizer makers. Fixation means the combining of pure nitrogen with other elements to form compounds which plants can use. Most forms disappear quickly from erosion, leaching, and cropping and must be supplied frequently to maintain fertility.

We know what nitrogen does for plants. It gives them their dark green color; promotes leaf, stem, fruit and seed growth; improves the quality of leaf crops; and

A FARMER who takes time to learn the chemistry of his fertilizer is a smart farmer. He knows the cash return to expect, what formula to buy, and how much to put down.



TREMENDOUS POWER is required to produce phosphoric acid. Here at a T.V.A. plant the cables supply the power, the pipes carry off the vaporized phosphorus from the cylindrical, vertical electrodes. Burning phosphorus lights the scene.

feeds the soil micro-organisms which decompose organic materials.

It takes 500 lbs. of nitrogen to feed these micro-organisms in an acre of fertile soil. They have first call on the nitrogen. Crops take what is left. We have a lot to learn about feeding soil organisms. Ordinarily they don't get enough food. One of the best foods for them is sweet clover. When farmers learn that they are the most important single factor in soil fertility, and learn how to feed them properly, many of our fertility problems will disappear.

Nitrogen combined with oxygen or hydrogen forms nitrate or ammonia nitrogen. In the nitrate form, like nitrate of soda, it is quickly available to plants, but it is also more likely to leach or move down out of reach of roots by the gravity action of water. In the ammonia form, like ammonium sulfate, it is not quite so readily used by plants, but neither is it leached so rapidly. Most plants need a balanced diet and grow best when they have both forms in the soil. The nitrate form is the one to use as a side dressing on a growing crop; the ammonia form is best for deeper applications.

The label on the bag of fertilizer always states the amount of the nitrogen, but not the form. I asked Jim about the state laws on labeling fertilizers. He said that is one thing that almost all the states agree on and a good thing it is too. Farmers know the amount and percentages they are buying. He added that when farmers become versed in the uses of the various forms the fertilizer people should add the form of each element as part of the information on the bag.

Nitrogenous fertilizer materials are obtainable from synthetic processes, natural mineral deposits, by-products of the iron and steel industries, and organic sources. Large amounts of atmospheric nitrogen are converted by synthetic processes into ammonium nitrate, sulfate of ammonia, cyanamid, urea, ammonia solutions, and nitrate of soda. Most nitrogen comes in dry form, but solutions high in nitrogen are coming into wide use, either being carried to the soil by irrigation water or applied directly by spraying.

Nitrate of soda from deposits in Chile have long been imported in large quantities. Most of this type is used as a side or top dressing on growing plants because it is quickly available and very mobile. The gas and coke industries supply nitrogen as sulfate of ammonia, which is used in a similar manner.

The above are all chemical forms of nitrogen. Organic nitrogen for fertilizers is supplied by plant and animal products such as guano, dried blood, tankage, seed meals, garbage, fish meal and others. "The Chincha Islands off the coast of Peru used to be our most important source of guano," Jim said. "Sea birds have roosted there for centuries and piled up mountains of dung, high in ammonia and phosphoric acid."

The cost of organic ammonium compounds is relatively high, and comparatively little is used.

Farmers can supply a limited amount of nitrogen to their soil without opening their pocketbooks; they can plow down legumes; they can leave crop residues in the form of stalks, stubble or straw; or they can apply manure. Rarely do these methods supply enough. Straw and corn stalks are low in nitrogen and they need extra nitrogen as a booster to start decomposition, but all the nitrogen they contain plus that used in boosting decay, is eventually made available to crops. That is why a heavily mulched field (with straw or corn stalks) should be top dressed with a fertilizer nitrogen such as cyanamid or ammonium sulfate to produce a good crop the first year.

The Lively Phosphorus

In its pure state phosphorus is a lively element. It bursts into flame when exposed

to moisture and must be stored under oil. It must be combined with other elements to curb its violence before it can be put into fertilizers to be used as plant food.

Many of our soils are deficient in phosphorus. The native phosphorus in soils is almost always "bound" or "fixed" in very insoluble forms and only a very small amount becomes available to plants in any one cropping season. Soils with a high total phosphorus content often fail to supply enough for a crop, so it must be added as fertilizer.

Poor plant growth is more often associated with lack of phosphorus than with the lack of any other plant nutrient. It is closely linked with the life processes in every living cell; without it there could be no life.

Phosphorus stimulates early root formation and growth, gives a vigorous and rapid boost to seedlings, hastens maturity, stimulates blooming and seed production, and gives hardiness to fall-seeded grains and hay crops.

In fertilizer it comes in the form of phosphoric acid and in this form it represents more than half the tonnage of plant foods in fertilizers in the United States. This country has more than half the known world supply in the form of rock phosphate deposits. We have enough to last 2000 years. Jim was hopeful about the future of fertilizer. "There'll always be something new turning up when we run out of something. Long before rock phosphate runs out soil chemists will work out other means of feeding crops. Radioactive fertilizers seem to be just around the corner. The potentialities of the soil are unlimited. We have barely scratched the surface in the possibilities of fertilizer and other means of increasing the yields of crops."

Superphosphate, made by treating phosphate rock with sulfuric or phosphoric acids, accounts for more than 90 per cent of all phosphoric acid in fertilizers. Ordinary superphosphate has an available phosphoric acid content of 18 to 20 per cent and in addition supplies the important secondary elements of sulfur and calcium in appreciable amounts.

Double superphosphate (sometimes called triple or treble) contains 40 to 50 per cent of available phosphoric acid but contains less calcium and sulfur than ordinary superphosphate, because there is less bulk of carrier material.

Other phosphate materials used as fertilizers are: phosphate rock, basic slag, ammonium phosphate, calcium metaphosphate, and potassium metaphosphate.

Finely ground phosphate rock is applied directly to the soil. This builds up the phosphoric acid levels in long-time soil improvement programs; it is not a substitute for the more soluble forms for quick results.

Basic slag is a by-product of the open hearth process of making steel and is applied directly to the soil. Ammonium phosphate, as its name implies, supplies

BAGGING A PHOSPHATE FERTILIZER at the Muscle Shoals plant at Sheffield, Alabama. During the war most of the phosphorus went into munitions. It is not yet too plentiful.

A SUPERPHOSPHATE "MINE" at a fertilizer plant. The acid and ore are stored in sheds, allowed to cure to more thoroughly blend, and are then dug out, ground and screened.

←WHERE TO APPLY fertilizer is quite as important as when and how much. Application at bottom of furrow has produced big crops. Attachments are inexpensive.

both nitrogen and available phosphoric acid.

Calcium metaphosphate and potassium metaphosphate are relatively new fertilizer materials and their use is just now getting under way.

I stopped Jim here to make the observation that pretty soon a farmer would have to take a course in chemistry to get along. "About right," he said.

Potassium Is Locked Up

In its pure state potassium is even more lively than phosphorus and is dangerous to handle. It too must be used as plant food in combination with some other element. In fertilizers it is known as potash.

The soils of this country are far richer in potash than in nitrogen or phosphoric acid. Unfortunately most of it is locked up in the soil in forms plants can't use. A soil may have 40,000 pounds of potash per acre within plow depth, but only a small amount becomes available in any one cropping season. Available forms must be supplied as fertilizer for a maximum crop.

Potash imparts disease resistance and vigor to plants, produces strong, stiff stalks and thus reduces lodging, increases plumpness of grain and seed, helps in the formation and transfer of starches, sugars, and oils, and like phosphoric acid, imparts winter hardiness to crops.

The potash used in this country comes from both native and foreign sources. Brines from Searles Lake in California are an important source of domestic potash. Potash deposits were discovered near Carlsbad, New Mexico, in 1931, and in 1938 in the Salduro Marsh of Utah. When foreign supplies were cut off during the war the American potash industry expanded and is now delivering over a million tons per year.

Muriate of potash is by far the most popular form for fertilizers. It contains over 98 per cent of pure potassium chloride. Other less important forms are manure salts, sulfate of potash, and sulfate of potash-magnesia.

Potassium nitrate, vegetable meals, tobacco stems, and by-product potash from the cement industry are additional small sources. "A lot of farmers throw their stripped tobacco stems back on the field," Jim said. "They ought to put them through a chopper first. Do a lot more good."

Potash is applied to soils both in mixed fertilizers and as separate materials.

Secondary and Minor Elements

Only in recent years have we attached any importance to the secondary and minor elements as plant nutrients. Calcium, magnesium, and sulfur, the so-called secondary elements, are in reality major plant nutrients; boron, manganese, copper, zinc, iron, and molybdenum are the minor nutrients. It was formerly thought that most of our soils contained sufficient natural supplies of both secondary and minor elements.

Also, commercial fertilizers supplied considerable quantities of these elements as so-called impurities and in carriers. The carriers in fertilizer are the bulk materials with which the actual plant food in the form of nitrogen, potash and phosphoric acid are mixed. Bulk is needed to make application easier and more uniform. In the past, sand, soil, ashes, and others have been used as carriers. In recent years dolomite and calcitic lime have been used. They supply extra plant food and some of the trace elements, and must be regarded, not as waste or "inert material," but as a valuable part of the fertilizer.

The development of more highly refined fertilizers carrying more nitrogen, phosphoric acid and potash has reduced the supplies of some secondary and minor elements in fertilizers. Also, with intensive cropping, greater emphasis on higher yields per acre, and with our soils becoming older and more depleted, the need for all essential elements becomes greater.

It is now known that poor yields can be due to deficiencies of one or more of the secondary or minor elements. The part they play in plant growth and in human and animal nutrition is still largely behind the iron curtain of scientific experiment.

(Continued on page 136)

ACCURATE TESTS on both the soil and→ the growing crops take the gamble out of fertilizer. The exact amount of the right kind placed properly saves dollars.

Herb Tripett introduces ingenious twists to an old, old job, earns the gratitude of all those who dig post holes, and qualifies himself for the degree, Master Digger.

Mr. Tripett Digs A Post Hole

BY R. J. McGINNIS

We like to keep up on new ways to do old jobs, especially if the new way saves time.

Just the other day we heard of a man down in Jessamine County who had studied post hole digging and had introduced several new twists which made this hard job easier and faster.

Digging post holes is probably the most frustrating job on the farm and no farmer will dig them himself if he can spare the money to get them dug for him. This is why there's a professional digger in every community, a man who does nothing else but dig post holes from one year's end to the next. He's generally in great demand and can command his own price.

The digger down in Jessamine County serves the southeastern part of the county and scattered townships in the neighboring counties of Garrard and Madison. He's a small man with squarish hands and a permanently bowed head which he says grew that way from looking down at thousands of post holes. His name is Herb Tripett.

Mr. Tripett is a man, one might say, who can button his own pants. Years of lonely work, digging holes up and down the slopes of Jessamine County have made him somewhat of a bucolic philosopher. He has very set ideas on how the world should be run. The flexibility of his mind has, so to speak, jelled.

"I don't go for these new machine diggers," he said testily. "They put men out of work and they don't dig a good hole."

He went on to explain that to the mechanical digger one hole is just like any

other hole and you have to follow them down a fence row, tailoring every hole to fit the post.

"What do they know about knots?" he added. "When I dig a hole for a post with a knot on it I can make the hole to fit." And he added, in a spirit of discovery, that a mechanical post hole digger can't think.

Mr. Tripett is a difficult man to find during the hot, dry months of July and August. He likes to dig in the spring and late fall when the ground is full of moisture and the temperature cool. He says clay dirt gets as hard as flint during the dry months and he can't make a decent day's wages. He works either by the day or by the post. Working by the post under ideal conditions he can set fifty in a long day. When there's a corner post to set, or a gate in the string, or the digging slow, he may only set ten. His wages are about double those of the average harvest hand, but he feels he is being fair because his skill is worth something.

He shuns the use of such effete contraptions as the surveyor's level and steel chain. To set up a straight line of posts he puts up a ten-foot pole at each end of his line and ties a newspaper on the top of each. He lines the posts up on these markers. He showed me what he called his masterpiece, a line of posts a mile long he had put up ten years ago. It was still as straight as a bee line.

To measure the distance between two posts he carries a rod length of staging wound up in a ball in his pocket. Knots at various lengths give him the standard distances for wire, post and rail, and other types of fences. He steps off the distance and uses the string to verify. "Many's the time I've gone a whole day," he says, "and not missed by an inch."

Mr. Tripett has bent his mind to subjects other than the evils of the mechanical age. He has reduced his own craft to a science. With some disdain he went on to say that post hole diggers for untold ages have all dug their holes and set their posts in exactly the same way until he came along, to invent a new technique and new accessories.

Most of Mr. Tripett's innovations are simple and reasonable and one wonders why someone hadn't thought of them before. He thinks that, ancient and modern, post hole diggers must have been pretty dumb.

He uses the conventional long-handled shovel, a tamper, and the "digger," an implement very much like an overgrown pair of pincers. The tamper is a six-foot peeled sapling used to firm the dirt around the post. The shovel is as old as history and the digger not much younger. In addition to these, which often are the only tools used by ordinary post hole diggers, Mr. Tripett carries with him regularly a five-foot chisel-end bar. He says it makes short work of rocks, heavy tree roots, and hard dry clay which one encounters on his way to the bottom of a post hole.

"I've seen fellers walk away from a hole," Mr. Tripett said, "because they struck a rock or a root their digger couldn't handle. Take a mechanical digger—if it hits a stone it just sets there; either that or it busts a rivet. I never left a half-dug hole in my life. That bar takes care of rocks."

The way Mr. Tripett sets about digging a post hole is a rare experience in effciency, neatness, and organization. He first gets the post he wants to set and examines it closely for odd formations such as knots and bends and swellings. He puts one end on the ground and squints down the length of it, turning it slowly and grunting when he finds a departure from the norm.

Next he takes his shovel (he has two, one a ditching spade and the other an ordinary shovel) and smoothes off a spot of sod about two feet in diameter where he will throw dirt from the hole.

"When you throw the dirt in the deep grass or weeds you have a heck of a time getting it out when you make your fill," he explained. "This way I can slide it right back in the hole."

He then lays another post along one side of the cleared space to bank the dirt for easy scooping and to prevent it from scattering.

Mr. Tripett then takes out a hunk of sod, about a half-shovel deep, where the hole is to go down and a little larger than the hole. This he carefully places to one side and will cap the fill with it when the post is set.

The soil is ordinarily free enough to allow him to go to 18 inches or two feet with the shovel or the spade. When the angle for the spade handle becomes too sharp or the soil too dense he lays the spade aside and picks up his digger. This he raises above his head and with a great grunt jams it into the bottom of the hole. He brings the digger full of dirt to the top and, opening it, deposits its contents on top of his growing pile of dirt.

Should some dirt stick fast to the blades of the digger he gives it a sharp thump against the post. Sometimes when the digging is in wet sticky clay this thump is not enough to clean the digger. Here is where Mr. Tripett's ingenuity has reached its peak. He carries along an old water bucket full of used crank shaft oil. He dips the digger into the oil, after thoroughly cleaning the blades, and the next digger-full peels off clean and completely.

While Mr. Tripett is working he keeps up a running monologue, addressing the hole and his tools. You might say he talks his way right down to the bottom and keeps everything under control, including himself. He accompanies his monologue with grunts, wheezes, and short low whis-

(Continued on page 141)

MR. TRIPETT'S YOUNG SON, Ronnie, holds the measuring twine and observes the fine points of filling in a post hole. Herb expects him to fill his shoes later on.

UNHATCHED, BUT DEAD of Newcastle, this embryo chick was innoculated with the virus through the shell. Its diseased tissues will be used to produce a vaccine.

NEWCASTLE DISEASE

BY CARL A. BRANDLY

This foreign plague of the poultry industry has spread across the nation. New methods of identification, vaccines and good management are our best weapons against it.

ONE morning in March, 1945, Rube Scott, in charge of a penthouse full of chickens atop the Huntington War Research Laboratory in Boston called me, "My chickens are acting funny," he reported. "Some of them have the gasps, some act like they are lame, and some are twisting their necks." These drooping, wheezing birds, suffering from nervous disorders and dripping discharge from beaks and nostrils were, as Scott suspected, suffering from Newcastle disease. In his isolated penthouse Scott had kept his experimental stock of 2,000 chickens hale and hearty for two years. Then, suddenly, Newcastle virus had sneaked in through a faulty air sterilizer. The stricken birds which did not die outright had to be condemned and destroyed. They were no longer useful for the critical research being carried on in the laboratories below.

This same tragedy has occurred many times, not only in laboratories, but in poultry flocks the world over, since Newcastle disease was first seen and recognized. Dr. F. C. Kraneveld first saw what is now generally known as Newcastle disease in the Dutch East Indies in 1926; Captain T. M. Doyle recognized it as a new disease in England later in the same year. Doyle gave it the name Newcastle disease after the town on the River Tyne where he first encountered it. It spread around the world faster than scandal in a crossroads village.

Newcastle disease brought loss and ruin wherever it struck. It spread like wildfire over vast areas, through the Orient to India, the Philippines, Japan, Korea, Ceylon, across the Lombok Straits to Australia and on to Kenya Colony on the east coast of Africa. In the late 1930's an unusual form of the disease reached the United States in California, but it was at least five years before it was identified as Newcastle. By 1939 it had reached Palestine and the Middle Congo.

That it could be stopped, stamped out by quarantine, slaughter and sanitation was proved in England twice—after the 1933 as well as the 1926 outbreak. The Australians also eradicated it by the same methods when the disease spread down under. But in countries like India, the organization of the veterinary service was inadequate to stamp it out, or even to control it at all. There, Newcastle became and remains the number one enemy of the poultry industry. In the United States the disease had become so widespread by the time it was recognized as Newcastle that quarantine and slaughter were not considered practical. The disease took a mild form in this country, causing its greatest loss through diminished egg production, but death tolls of 20 per cent in infected flocks are far from rare.

Chickens and turkeys are the most common victims of Newcastle but it attacks all kinds of poultry and birds, pigeons, guinea fowl, pheasants; even ducks, geese, crows and finches have sickened after contact with the virus. No bird, tame or wild, is immune to repeated contact with it, experienced researchers believe. Not only are our feathered friends killed, but investigators at Maryland were able to infect and kill hamsters and white mice

with the virus. In Australia, Dr. F. M. Burnet contracted eye infection while working with Newcastle virus in incubating eggs, which he'd found excellent for growing the virus. Later, Dr. Anderson saw two cases of eye infection in Australian laboratory workers. Then doctors in Palestine found Newcastle virus in the sore eyes of chicken handlers, as well as of laboratory technicians. Fortunately, these infections were mild and transient, but already there are signs that Newcastle may produce more harmful results in man. Some experts believe it might become as serious in people as has sleeping sickness, the so-called "equine encephalomyelitis" of horses.

Defending the Home Front

With the outbreak of World War II our military men and scientists began the stupendous task of planning against all eventualities. Food was, of course, recognized as a weapon, and poultry, eggs, milk and beef were top items of concern. Disease introduced accidentally or for sabotage could quickly decimate our flocks and herds. A careful check led to the singling out of two diseases of poultry, Newcastle disease and fowl pest, and one of cattle, rinderpest, as the most serious threats. These were given priority for three reasons: (1) they had bad records, spreading rapidly and killing or maiming a large proportion of animals attacked; (2) they had yielded only slightly or not at all to man's efforts to vaccinate or otherwise control them; (3) they were not thought to be present in this country and thus our animal population could be expected to be highly susceptible to them.

For a place to study and improve means of diagnosing these maladies of poultry and of developing better methods of controlling them, the Harvard Medical School offered the old Huntington Memorial Hospital. It was hurriedly equipped with all modern isolation, quarantine and decontamination facilities. Then there began work on an emergency schedule by proven researchers in this field, Dr. E. E. Tyzzer of blackhead and coccidiosis fame, Dr. Elizabeth Jones, discoverer of epidemic tremor, Dr. Erwin Jungherr, outstanding authority on numerous animal diseases, Dr. Harold Moses, fresh from the Mayo Foundation, and the author of this article.

Working behind the closed doors of the Huntington laboratory and free from outside interruption, rapid progress was possible. Methods of diagnosis were developed, improved and simplified. Today, with added study and practice, we have better diagnostic tests for Newcastle disease and fowl plague than for any other infectious diseases of poultry. This research team determined, also, many of the advantages and limitations of *living* as well as *killed* vaccines for Newcastle and fowl pest. The behavior of these viruses and their means of spread were also clarified.

The Huntington researchers discovered the important fact that hens immune to Newcastle pass on to their chicks through the egg yolk enough antibodies to protect them for the first month of life. They also found that while the yolk immunity protected the chicks for a while, it kept them from becoming immune as a result of vaccination or infection since the vaccines would not take nor could the chicks become infected with the disease during their brief period of immunity. For this reason, vaccination of such chicks from immune hens does no good. After they are a month old the protection which the yolk has given them disappears and vaccination is effective.

There was another important outcome of this foresighted war-time planning. In 1942, two California veterinarians, D. E. Stover and J. R. Beach, had recognized and described what they thought was a new disease of chickens as respiratory-disorder, and had named it pneumoencephalitis. That it was not suspected of being Newcastle was due largely to its rather mild form and low death rates. The chance that the California disease might be Newcastle or fowl plague, however, wasn't overlooked. Dr. Harry Schoening of the United States Bureau of Animal Industry obtained antiserums for both diseases from England for Dr. Beach to use. Beach's tests, limited by the amount of serum available, gave evidence of the relationship of the California disease to Newcastle. Other similarities were not demonstrated, however, until virus and tissues were taken to the Huntington laboratory in January, 1944. Here, within a period of twelve days of intensive effort, it was possible to pin down the California plague. It was proved beyond doubt that so-called pneumoencephalitis was Newcastle disease. Here again Newcastle had earned a new name, its fifteenth, this time because it had shown up in a peculiarly mild form. Again, in February, 1945, when Dr. F. R. Beaudette suspected that the disease was present in New Jersey, tests made at the Huntington laboratory and with Newcastle serum sent him from Boston, proved these suspicions well founded.

New, also, was proof from the Huntington laboratory that with the breakdown of

THIS IS NOT A TRICK, but a deadly sign that Newcastle has reached the bird's nervous system. Gasping, and paralysis of wings and legs, are other symptoms of the disease, but only blood or egg yolk tests will give positive identification.

disease control programs brought on by the war, Newcastle disease reached Europe and spread rapidly. Literature coming through military channels told of a destructive disease of fowl in Sicily, Italy and later Germany. European scientists thought it was fowl pest, laryngotracheitis or other maladies. But when American troops invaded Italy, suspected material sent to the Boston laboratory showed the disease to be Newcastle.

With termination of the war research work at Boston, research and educational work has proceeded on a large scale. Especially active have been the United States Bureau of Animal Industry and many of the agricultural experiment stations, state universities and colleges.

Symptoms

T. C. Martin, a poultry farmer in southern Indiana, learned to recognize Newcastle the hard way. The first sign that something was wrong was in the feed hoppers; very little mash had been eaten and when he came in with the scratch feed the hens did not rush and crowd to get there first and get away with the most. Within a couple of days egg production had fallen off alarmingly, some of the eggs were soft shelled or rough shelled. By this time the flock was a droopy, sleepy looking bunch of birds, some of them dripping mucus and sneezing, others with feathers soiled and plastered with a greenish diarrhea.

It didn't take a veterinarian to tell Martin that he had a flock of sick chickens on his hands, but it took one to tell him what the trouble was. The doctor looked at the flock, listened to their gasping breathing, asked Martin if any of them had become lame or paralyzed, or if he had noticed any with their necks twisted around into unnatural positions. He then announced that it *could* be Newcastle, but the trouble was it could also be pullorum, fowl typhoid, bronchitis, tracheitis or some other disease. You just can't tell for sure by looking at the flock. A sampling of the eggs had to be taken to the laboratory and tested before Martin knew definitely that he had Newcastle on the place. The shocking thing to Martin was that there was nothing he could do about it; he just had to sweat it out while the disease ran its course, killing 10 per cent of his flock and keeping the rest off production for almost two months. His only consolation was that the disease hadn't hit him when he had young chicks under the brooders, for his losses would have been much greater.

An Ounce of Prevention

There are no cures for Newcastle disease. Once an individual shows signs of it, no medicine, serum or vaccine will help. An ounce of prevention in this, as well as other diseases, is still worth more than unlimited pounds of cure. Prevention by management and sanitation aims to keep the virus from contact with the susceptible bird. Particularly dangerous are birds or flocks in the early or active stages of Newcastle disease. Partly or completely recovered individuals may remain carriers and spreaders of the virus for several weeks and months or even longer. Not only the saliva and droppings of affected birds, but their eggs may carry infection. Gasping, sneezing, and coughing throw dangerous, germ-laden droplets into the air with resulting spread to nearby pens or houses of healthy poultry. Windblown infection, including that borne by dust, seems to travel only short distances at best. This is due, in part, to the fact that the very small dust or moisture particles give the virus little protection, and it dies off quite rapidly. The virus can live for several weeks and often hitch-hike a ride to other premises on shipping crates, egg cases, or other material or equipment contaminated with droppings from diseased birds. The infection may be carried to clean flocks and areas on the hands, clothing or shoes. For this reason, culling and blood testing crews have to practice a rigid clothes-changing routine and disinfection of all equipment after finishing work at one place before going to another. For the same reason, most poultrymen in areas where the disease is present don't welcome visitors who want to walk through their coops.

Sparrows, pigeons, and other wild birds can carry and spread Newcastle from place to place. Furthermore, they needn't become visibly sick to do it. Many poultrymen are putting up finer meshed wire to keep the small wild birds out of the houses.

Trucks that haul chickens can carry the disease. They should, of course, be periodically disinfected, but it is a wise practice, when getting chicks from the hatchery, to bring them home in your own car to avoid exposure to disease in shipment.

Once infection gets into a unit or flock, the surrounding equipment and litter become heavily contaminated in a short time. Just how long deep litter may remain infective isn't known, but it must be completely removed before healthy poultry are brought in.

Killed Vaccine

The other means of prevention is vaccination. Much progress is being made in preventive vaccination and we may anticipate much more.

We can expect as much and no more from Newcastle vaccines than we can from vaccines for other virus diseases, for example, fowl pox and hog cholera.

Recent work in this and foreign countries shows that a safe tissue vaccine can be made from incubated fertile hen eggs that had been innoculated with the virus. High concentration of the virus develop in such eggs during incubation. The addition of formaldehyde or exposure of the

LIVE VIRUS VACCINATION is done by the stick method: the wing is pricked with needles dipped in vaccine. The birds get a mild case of Newcastle and must be protected against other infection. For two months they can spread the disease.

ALL BREEDS OF CHICKENS are subject to Newcastle disease. Older birds stand a better chance of surviving than chicks. Because America has a less virulent strain of Newcastle, our greatest loss comes from decreased egg production rather than death.

infected embryo tissues to strong ultraviolet light kills the virus. This dead virus can still stimulate vaccinated birds to develop a strong immunity. The chief drawback of a killed vaccine is the rather brief protection it gives. While protection shows up within four days, it may run out within a couple of months. In other cases, the resistance to infection may last for six to eight months. But we can't, with the killed vaccines known so far, depend on regularly getting protection for this long a period. Authorities recognize the present place for killed vaccine, especially in laying flocks and for chicks of susceptible dams during the first weeks of life. Early in an outbreak it gives quicker protection than a living vaccine. It may also be given first to cushion the shock of a subsequent living vaccine.

Killed vaccine contains no living virus; hence, it cannot cause even the mildest form of reaction to Newcastle as do the living vaccines under the best of conditions. With the living vaccine, live virus is brought onto premises which have been free of the infection beforehand. Once introduced, the infection may carry over from year to year, as fowl pox does. Only killed vaccines can be used in baby chicks with safety. An Iowa veterinarian recently reported that about eight drops of the killed vaccine given to baby chicks protected them through the broiler period. Earlier, the United States Bureau of Animal Industry's veterinary researchers ran field trials with 57,000 broiler chicks. In one plant, they gave a killed commercial vaccine to 37,000 and left 2,000 without vaccination. The vaccine did not entirely prevent the disease, but except for small losses the vaccinated chicks withstood severe infection which killed many of their unvaccinated brethren. Here, vaccination proved the difference between a profit from the vaccinated lot, and a financial loss in the unvaccinated.

In vaccinating laying birds and those near production with killed vaccine, the loss is chiefly that due to handling. There are no serious production drops complicated by lowering of egg shell and egg white quality as sometimes happens when living Newcastle vaccine is used.

Living Vaccine

Experimenters in India, Palestine and at the Huntington Hospital ran into the same difficulties that accompany all living virus vaccines. Weaker virus strains which gave good immunity could make the vaccinated chickens quite ill. Part of them sickened, some died. Picking out a modified or weak strain from many Newcastle strains he'd obtained from field outbreaks, Dr. Beaudette, at New Jersey, found one which was quite safe. With it he made laboratory and field tests. In the spring of 1948 he felt that it could be tried on field flocks and production of the vaccine was undertaken by the Vineland Poultry La-

(Continued on page 121)

ROY E. ANDERSON, Norwood Park, Ill., grows and markets 35 acres of chives, the largest acreage of this herb in the Midwest. He designed the crate, which holds a dozen pots of chives and packs easily for shipping. All his plants came from a dozen started by his mother when he was a school boy. A crate of chives brings from $1.25 to $2.00, depending on the season.

IN THE EARLY 1500's soon after white men came to Mexico, an Aztec physician wrote an herbal, America's first medical book. Amazingly, he inscribed to numerous herbs the same properties European doctors had discovered. Thus, independently, on two continents, the same type of medicine developed. Shortly thereafter, in 1552, another Aztec, educated in a Spanish mission, translated this herbal into Latin, using clays and an insect, *coccus axin*, for coloring. The translated edition of this herbal found its way to the Vatican Library, where it reposed in a forgotten nook for hundreds of years. Recently, it was discovered there by Professor Charles V. Clark, a traveling scholar from Johns Hopkins University and has been published under the title of "The Badianus Manuscript," one of the most beautiful and delightful works of man. This illustration is a page from that book and tells how an herb, copal, was used to relieve stomach ache. (It did.)

Quauhtla huiz quiliti. Velic pahtli.
Ventris fugiditas.
Ventris aiget expellitur potione sumpta ex radicibus herbarum cepaliyac xiuhtontli, tlanexhixiuhtonthi, chichic xihuitl & quauhtla huiz quiliti centritis addito vino Indico.
Purgatio ventris.
Cum venter fuerit purulentus, ejicies pus, si infirmus ante prandium maqua calfacta biberit potionem ex radice trita herbae nomine velicpahthi. Lectus vero vel locus ubi iacet eger, thimus odore adolebitur, quo noxius aer expellatur.

Herbs

BY ROSELLA MATHIEU

ROSEMARY and thyme, basil and marjoram; these are not the cargo of a caravan out of the East, nor are they the stuff out of which poets spin their verses. They are plants with subtle flavors that go into the stew or the salad dressing. A housewife calls them herbs.

Close cousin to these savory plants are medicinal plants also known as herbs, as old as thyme and yet as new as a freshly printed pharmacopeia. The growing and marketing of culinary and medicinal herbs is an exclusive and highly specialized industry in this country. Because of large quantities of cheap dried imports, a very few people supply all the herbs on the American market.

From the field, herbs gross from $350 to $500 the acre. But unlike wheat or corn, herbs also lend themselves to merchandising.

Who Discovered The Herb?

How did primitive man discover that the roots of aconite warmed his blood when the ague was on him, or learn that spider webs helped stop the flow of blood? We don't know, but from early times mothers dosed their families with herb teas for fevers, poulticed an inflammation with plasters of belladonna leaves and used flaxseed for a sty. Although medicinal herbs were surrounded by the grossest superstitions, the amazing thing is how many were effective.

To our colonial ancestors, herbs were either "yarbs", leafy greens for eating or seasoning; or "simples", remedies for coughs, fevers, and all the other ills that beset the pioneers.

Friendly Indians taught the early settlers how to use the native plants; their herb lore influenced the American palate for generations. The Indians not only taught the colonial dames how to wrap a sore throat with mullein, and to cure earache with a solution made from the common blue iris, but how to preserve meat with tansy and which plants to gather for dyes. After the Boston Tea Party it was considered unpatriotic to drink the black tea imported from England, so the New Englanders tried the Indian drinks like red bergamot, called Oswego Tea, pennyroyal, and wintergreen.

To older readers raised on the farm, the word "herbs" brings back nostalgic memories of the fragrant bunches tied up in paper bags and hung in the shed to dry. To botanists, an herb is "any leafy plant without a woody stem."

But among both laymen and farmers, at least the term has narrowed down, and

MRS. HARRY SCHAUL, a housewife and mother of six children, supplements the family income by growing a half-acre of parsley next to her home on the outskirts of Chicago. She cuts the parsley by hand and bunches it with rubber bands. Most of the parsley for local markets is grown on small plots of less than an acre. The market is easily glutted.

when we speak of herbs, we generally mean plants used for drugs, or sweet and aromatic herbs for flavoring. Sometimes the leaf and sometimes the seeds are used, while occasionally, as in the case of horseradish, it is the root which is valuable.

The Herb Set-Up

Here's one way of classifying growers who are engaged in various phases of the herb-growing industry:

1. The trade has a cozy phrase for the little fellow's place: "The cottage garden herb industry." These are farmers, often women, cultivating one-fourth to one-half an acre and selling herb plants, freshly bunched herbs, and, in autumn, dried herbs to their nearest local chain grocery store. They also sell herb vinegar or possibly sachets made from fragrant herbs through neighborly merchants. Total income from part-time labor of one person may be $100 to $800 a year.

2. The herb merchandiser is usually a farmer who is more promoter than he is planter and weeder. Often starting as a cottage-type herb grower, this farmer by stylishly packaging his herbs gets them into stores. Of the six major herb merchandising companies, grossing over $50,000 a year, all started as small growers, although today several buy their herbs on the market.

3. Market gardeners with one to 20 acres in herbs. Selling direct to commission houses, they grow a variety such as sage, summer savory, tarragon, basil and thyme. These larger growers sometimes specialize in a single herb crop such as horseradish, dill, water cress, anise, mustard, parsley and fennel. There are about 1,000 growers with a half acre or more.

4. The grower of medicinal herbs such as belladonna, henbane, golden seal, and foxglove who have small plots and contract ahead of planting time with pharmaceutical houses such as S. B. Penick and I. P. Callison.

Danger Signal

The first principle of herb growing is to explore your market before you plant and the second is to learn the uses and values of "the mighty herb." The demand for many of these crops is so fixed that two or three new growers coming into a community can flood the market to the point where both the established growers and the newcomers lose money.

A few of the truck farmers I have visited do not use herbs in their home cooking, and they sell to town buyers by the pound or by dozen bunches without fully understanding the subtleties and rarities in their possession. A man who has been fattening hogs all his life knows the dollar value of "good lean milk-fed hogs; all meat. No fat roll around these hams," he says. "Not a cripple in the lot. Worth a premium from any packer." A successful herb grower knows what delightful flavors can be added to foods if herbs are rightly used.

HERBS HANG from the roof of the loft of the Heckel drying barn. Carl Heckel rubs a leaf to see if it is thoroughly dry. Drying is a slow process in damp weather. Herbs must be moisture-free before they are stored, else they may mold.

The Cottage Gardener

Those who are interested in developing a small business of this kind, should start with a kitchen garden. Before any commercial venture is undertaken, the plants should be grown for a year or two, in order to learn about cultivation, harvesting, and how each herb by itself and in combination may be used.

A small plot near the kitchen door is a good spot for the herb garden. If this is not available, the herbs may be set out in rows in the vegetable garden.

The plants suggested for a start are listed on page 104, and the yield from them will be sufficient for the use of a family of six and some left over for gifts to friends. They will supply fresh herbs for seasoning all summer, fresh herbs for vinegar, dried herbs to be used for winter cooking, and fragrant herbs for pot-pourri and sachets. Observe how your family and friends respond to each item, so you can get an inkling of public demand.

The seeds of annual herbs may be sown in rows or beds outdoors, or for an early start, in cold frames, hotbeds, or in well-prepared soil in cheese or cigar boxes, set in a warm place in the house. I used to begin my own in cigar boxes, covered with a piece of burlap, and as soon as seedlings sprouted, transferred them to a sunny window. If started in the house, care must be taken that seeds are sown late enough so the weather is right for transplanting when they are about two inches high, as after that they will get spindly indoors.

Perennials such as sage, tarragon and lavender are propagated by cuttings. Pieces about four inches long are cut with a sharp knife from the upper part of the old stems in late summer. Each piece should contain a set of leaf buds near the top, the large leaves being removed. Cuttings must not be allowed to dry out. I prefer coating the bottom end with a rooting hormone powder.

The cuttings should be placed in a shallow box containing clean wet sand to a depth of over half their size, being careful to pack the sand firmly about each stem. The sand must be kept moist at all times. Cover with a piece of glass, allowing about a half inch space for ventilation along one side. Place the box in a light spot out of the direct sun. In about two weeks it may be moved where it will get sunlight part of the day.

It takes four or five weeks to develop a root system which will enable the cuttings to be moved to a cold frame over winter. In the spring the plants may be set in the open ground. The ground should be dug two feet, well prepared so it is friable and has a fine tilth.

Herbs will grow in any soil suitable for vegetables; sunny, well-drained and not too rich. Most like it slightly alkaline. A light sandy loam is preferred, and good cultivation is a great help where soil is heavy.

In harvesting, cut tops and tender stems just as the flower heads are ready to open, after the dew has dried off in the morning. If leaves are unduly dirty, they may be washed off quickly in cold water and shaken briskly. Dry the leaves in the shade, on a wire or muslin tray. The barn

Common Herbs and Their Uses

Name	Classification	Height	Spacing Apart	Method of Propagation	Number Needed for a Family of 6	Uses in Cooking	Remarks—Herb Lore
Sweet Basil	A	18"	10"	Seed, sow in hotbed and replant.	8	Affinity for anything with tomatoes. Green salads, eggs, fish cocktail sauces, mock turtle soup. Beef dishes. Excellent in vinegar.	Anise-flavored. Native of India. Over fifty varieties of basil. Peppery when it matures.
Dill	A	30"	12"	Seed.	8	Fresh leaves in creamed chicken or mashed potatoes. Fish sauces, pickles, vinegar.	Called meetin' seed. Kept children quiet during long sermons. Used in love philtres.
Burnet	P	12"	12"	Seed.	6	Cucumber flavor to salads and vinegar.	Used as forage crop. In olden days used for healing wounds.
Chives	P	12"	12"	Seed or division of plant.	8	Minced with cottage cheese. Garnish for creamed soups. Omelet, salad. With big lump of butter, lemon juice as dressing for steak.	Not the same variety, but the same family as wild onion, the pasture's curse. Chives are stronger with a heavier stem.
Garlic	P	12"	5"	Bulblet or clove.	12	Rub wooden bowl for salad. Spaghetti sauce, all meats, broiled chicken.	It was once thought that garlic, because of its hollow stem, cured diseases of the windpipe.
Pot Marjoram	P	24"	12"	Seed or division. Multiplies quickly.	2	Fresh in salad. In roasts, stews and poultry stuffing. Vinegar.	Flowers used in pot-pourri. Fresh for tea for headache and nervousness.
Sweet Marjoram	t. P	12"	6"	Seed or layering.	20	Same as above. S. Marjoram is milder in flavor. Spinach. With thyme and tarragon in pork sausage.	Flowers and leaves in pot-pourri. Oil in perfumery. Fresh leaves used to rub down furniture.
Parsley	B	12"	6"	Seed.	12	Garnish. Soups, cottage cheese balls, minced over potatoes.	Ancients considered the powdered seed a cure for baldness.
Rosemary	t. P	20"	10"	Seed or cuttings.	6	Creamed soups. Poultry, stews, sauces. With garlic on lamb.	Burned with juniper in French hospitals to prevent infection.
Spearmint	P	20"	12"	Root.	10	Minced fresh with peas, pea soup, carrots—do not cook. Vinegar. Jelly, sauce. Steep for tea.	Oil used for chewing gum, candy, soap, tooth paste, mint julep. Do not confuse with peppermint.
Sage	P	20"	12"	Seed or cuttings.	4	**Use sparingly.** Poultry dressing. With grated orange and juice on duckling. Veal. Cheese. Tea.	Mildly tonic. Said to strengthen the memory. Chinese value it for tea. Gargle for colds.
Summer Savory	A	15"	8"	Seed.	12	String beans, salads, soups, stuffings and sauces and egg dishes.	Used as purgative, Bleach for tanned complexion. Old herbal says it makes a man lecherous.
Tarragon	P	20"	10"	Plants only. Does not set seed.	4	Green salads. Dressings. Vinegar. Fish sauces. Tartar sauce. Creamed chicken, chicken aspic. Hollandaise sauce.	Oil used in confectionery and perfume. Chewed to sweeten breath and to kill taste of medicine.
Thyme	P	6"	5"	Seed or layering.	12	Meat and poultry stuffing. Gravies, soups, eggs, beef stew. Onion soup, clam chowder, fish.	Oil used medicinally. For perfume, soap, tooth powder. In wine. Dried leaves in pot-pourri. Flavors honey.
Lavender	P	24"	10"	From seed.	10	Not used in cooking.	Oil used in perfumery. Spikenard of the Bible. Ancients used it in their baths. Sachets.
Lemon Verbena	t. P	36"	15"	Cuttings.	4	Tea. Flavors jelly.	Dried leaves have odor out of this world. Sachets and pot-pourri.
Rose Geranium	t. P	24"	15"	Cuttings.	4	Flavors jelly.	Oil used in perfumery. Dried leaves in sachets and pot-pourri.

A—annual, B—biennial, P—perennial, t.P—tender perennial, treat as annual.

or a warm attic room are ideal, as long as there is a good circulation of air. Stir the leaves each day, so air gets to all of it. When thoroughly dry, shake gently to settle dust, or whisk about in a large strainer.

Then clean leaves off the stems, but do not crumble. Store in air-tight, clean, tin, plastic or glass containers. If herbs are packed when even a little damp, they mold.

Herbs dry down to about 10 per cent of their moist weight when harvested. After you are acquainted with the growing and uses of herbs in your home, comes the time to find out where you can sell them.

Merchandising The Herb

When I started to sell my basil, thyme and tarragon, every hotel cook I called on said: "Sure, we'll try some." They were glad to meet a grower. I carried samples with me and crushed the leaves, letting the cook smell the various herbs to show their full strength. Take some fresh plants with you, root and all. Some cooks have never seen an herb growing.

I always suggested that the cook advertise on his menu that he uses herbs, and name them. This creates more demand. You may be able to sell not only the hotel or restaurant, but packaged herbs to the patrons who, through tasting the fine food prepared with them, are won over to their use.

This is exactly how Sheldon and Harriette Widmer developed their "Cherry Hill Herbs," grown especially for Nashville House, an inn in Brown County, Indiana. A few years ago when they retired to this section, they began raising herbs as a hobby. Today, they are busier than they have ever been, growing and marketing their herb products.

Call on the managers of some large chain grocery stores and ask if they will buy fresh or dried herbs from you. They may be interested in buying dried sage, dill, marjoram and thyme in the fall, and you can take orders for future delivery.

Bunched herbs in a wax or butcher paper cornucopia, which is the simplest way to present them for sale, sell for 10 cents to 15 cents a bunch. Dress up

THE FRESH SAGE LEAVES Carl Heckel is smelling will make somebody's turkey or sausage more tasteful. The twine used for bunching hangs handily from his belt. The Heckels gross $360 a season from an acre and a half of thyme, sweet marjoram, summer savory, wormwood, and sage.

the same herbs in some brightly figured wrapping, add a slip of paper giving a few recipes and tie with some colored twine, and you may be able to get from 15 cents to 25 cents for them. The package is what sells the herb on first acquaintance.

An inexpensive way to package dried and de-stemmed herbs is in cellophane or glassine bags. Ounce-size bags range in price from one-third cent to one-half cent each when bought in small lots. In amounts of 1500 or more the price comes down to around one-fifth cent each.

For a better looking product, an assortment of from six to eight cellophane bags may be packed in an attractive box, with a few suggestions for use. Stock boxes may be bought from companies specializing in their manufacture for around 10 cents.

No matter what container you use, a neat label is necessary, giving ingredients if it is a mixture, and net weight.

Take the packages you have created to the food buyers and see whether they are interested in trying out your products. If you cannot find anyone to encourage you, then there is no point in planting a larger area. If, however, you feel you can work up a demand for your herbs, try a small area, say a quarter of an acre of sage, basil, sweet marjoram and thyme. The project should be kept small enough so the work can be done by you or your family.

Planting One-Quarter Acre

As early as the soil is ready to plant, warm and not too wet, about 100 pounds of a chemical fertilizer such as 5-10-10 or 3-12-6 (not too high in nitrogen as this causes loss of flavor) is worked in. If the ground needs liming to bring to a pH of 6.5 to 7 this should also be done at this time.

(Continued on page 96)

CANNED GRASS

Farmers are "pasturing" their stock throughout the winter months by feeding ensiled grasses and legumes. They save the 30 to 50 per cent of feed value that escapes from hay before it reaches the stalls.

BY ROBERT WEST HOWARD

WHEN THE FARMER climbs into his haymow and lifts a forkful of alfalfa, he is holding from 30 to 50 per cent less food value than the same forage contained when it was mowed the previous summer. This is the loss that hay sustains from the time it is mowed until the time it reaches the feed stalls. Now, however, farmers and scientists are getting in effective licks against this loss. Feeding grasses and legumes as hay is one of the oldest and most appalling wastes on American farms.

The cure prescribed for this vast waste is as simple and effective as a good housewifely recipe for making applesauce. Cut your hay while it is still knee-high grass, rich in protein and carotene; chop it fine, while it is still moist; can it, in a silo or in a pit. Processed properly, it has one up on the applesauce; it does not need "sweetening." Preserved in its own juices, canned grass comes through with feed qualities that sound like a drug clerk's rapid-fire talk over a bottle of vitamin pills.

National use of grass silage, according to figures supplied by the Agricultural Research Administration of the USDA, would put another four to five million tons of protein into the feedbox for American livestock each year. Even more startling statistics come from the School of Nutrition at Cornell University where tests have shown that good grass silage maintains a winter-long average of 30 milligrams of carotene (i.e. vitamin A equivalent) to the pound, as compared to four to eight milligrams per pound for average, field-cured legume hays. That rating, by the way, is three times the vitamin A average for corn silage.

The reasons for this, as for so many other laboratory discoveries, are quite simple. Carotene, the vitamin-A-equivalent in grass, is particularly susceptible to the presence of oxygen. Oxygen in the atmosphere removes the carotene and other chlorophyll components from hay during the average field-curing process in much the way that boiling water leaches the color out of a kettle of beets. This waste has been going on, full tilt, on every American farm since the day Miles Standish's musketeers first stood guard over the cutting crews on the salt hay marshes outside Plymouth.

In 1948, we threw away the equivalent of 28,000,000 tons of O.P. (old process) linseed meal feed, because of our "Maud Muller" traditions of hay making.

"Our tests indicated that the first and second cuttings of field-cured hay suffers a loss of 260 to 270 pounds of protein per acre," R. E. Hodgson, assistant chief of the Bureau of Dairy Industry, USDA, told me recently. "If the crop is damaged by wet weather, losses will run a lot higher than that. But when our hay cuttings were made into silage, approximately 137 pounds more protein per acre were saved for feeding . . . about as much protein as is contained in 400 pounds of O.P. linseed meal.

"In 1947, when our test fields were damaged by rain, about 40 per cent of the dry matter and 50 per cent of the protein was lost in the field-cured hay."

Tillman Bubenzer, who is manager of Conner Prairie Farms near Noblesville, Indiana, says, "We use grass silage because the majority of our fields are in grass. We have a surplus in the spring and we consider grass silage a better feed than hay when fed with small amounts of hay. Then too, when we make grass silage we are rather independent of the weather."

Grass silage, like alfalfa, is a multi-harvest crop anywhere. Any cutting of grass can be made into good silage, provided it is green enough to pack. A mixture of second-cutting alfalfa and brome won first prize in the grass silage competition at the New York State Fair last fall.

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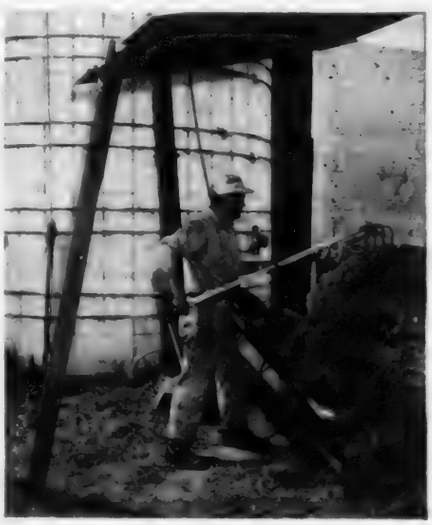
GROUND CORN AND COB MEAL preserves grass silage, increases its feed value, and helps make it tasty. A ton of legumes needs about 175 pounds of meal. A small feed grinder with an elevating fan could grind the meal and blow it directly into the elevator, leaving the farmer free to concentrate on his pipe. Other preservatives for grass are molasses and milk products.

GRASS SILAGE, heavy with moisture, must usually be guided into the elevator with a hand tool. If the tail gate falls, this farmer may be late for supper.



From New England, where grass silage exhibits perfumed Field-Crop Halls at 150 state and county fairs in 1948, west to dairy-rich Humboldt County, California, the rules for putting up this crop are simple and fairly universal. There are, in all, six basic requirements:

1. For best results use a 60-40 mix of grasses and legumes . . . timothy and red clover; alfalfa and brome; soybeans and millet or even weeds-and-timothy. Any forage that can be fed dry can be ensiled, although alfalfa and brome is conceded to be the best mix.
2. Mow grasses right after heads have emerged; alfalfa, in early bloom; clovers, half to full bloom; cereals, pre-bloom to early dough.
3. Windrow, and let the sun wilt out to a moisture content of 62 to 68 per cent. H. E. "Ed" Babcock, who has experimented with this type of silage on his Sunnygables farms near Ithaca, New York, for the past 14 years, advocates a "grab test" as the best means of telling when green grass is right for ensiling. "Just grab a fistful of it as it comes out of the chopper," he advises. "If, on opening your fist, the ball of material is compact, but not wet, and *then slowly springs apart,* you have just about the moisture content you need."
4. Run the moist grass through an ordinary ensilage chopper, set to cut in one-fourth inch lengths. Length of this ensilage cut is an important point. "As fine as possible," advise engineers at the government experimental station at Beltsville, Maryland.
5. Blow the stuff right into the silo. It isn't necessary to keep a man in the silo to level off. This is a denser mix than corn silage. Better be sure that the silo is strong enough to hold the load. If you've any doubts, extra hoops around the bottom half is a good precautionary measure. Dairymen in the Northeast level off after every two or three loads and pay special attention to packing it in along the walls.
6. Top the silo off with a "cork" of the highest moisture grass you can get hold of. This grass, filling the last 15 to 25 per cent of the silo, shouldn't be wilted at all. The "cork," reduces moisture loss from the stored forage, gives air no chance to enter and is solid enough so that air leakage through the sealing layer is slow or impossible. Tramp the cork in, twice a day, for a week, until it is hard to see the settling of silage during trampling. Top losses can be reduced by seeding oats on top to make a good air seal.

Follow the rules above and, come January, you'll have the nearest thing to June pasture of any home-grown feed ever to whisk down the barn chutes . . . with healthier livestock, higher milk production, and friskier calves.

Permanent upright, pit-type, trench, fence or stack silos can be used for grass silage. The set of rules above applies to the permanent, upright type and assumes that the structure is in good repair with airtight doors, smooth walls and a drainage system that will permit excess moisture to escape rapidly.

In trench siloing, the size depends on the number of animals to be fed. At least a two-inch layer of ensilage must be removed every other day. The trench should be wider at the top than at the bottom, with the bottom above the level of groundwater, sloped at one end to give drainage. The grass silage should be kept level, and thoroughly tramped or packed, during the filling operation. Pile it high enough that the top will mound above ground after settling. Then, cover the surface at once with a layer of fresh grass or weeds, and cover this with six inches to a foot of earth. Be particularly careful, with trench silos, in packing the ensilage. If, because of poor packing, the top of the silage settles below ground level, surface water will enter and spoil the ensilage. Some farmers drive their tractor back and forth across the silage as it is blown into the pit.

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WHEN THE BLOWER bites off more than it can chew, work stops while its pipes get a cleaning. Chopped grass is heavier than chopped corn. This means harder work for the blower and usually extra rings on the bottom half of the silo.

THIS METHOD of harvesting grasses and legumes leaves no work for the pitchfork. A mower attached windrower, or side delivery rake, sets the stage. The field chopper follows, chops the grass as fast as it can pick it up, and spews it into the wagon.

Gov. Thomas E. Dewey became a convert to this system last July when he dug a 100-foot trench silo on his livestock and dairy farm atop Quaker Ridge, near Pawling, N. Y. By late fall, many of his Holstein's were consuming an average of 100 pounds of grass silage a day and only two or three pounds of hay, even though the hay was in front of them all the time and the silage put into bunks three times a day. This ratio, although pleasing to the canned-grass missionaries, is extraordinary. The fact is that the Dewey farm had a bad hay crop in the lofts. The average canned-grass consumption of cows is about three pounds a day for every 100 pounds of live weight. A 1300 pound cow would eat about 40 pounds of grass silage daily.

The grass silage can replace the legume hay in the ration. In tests dairy cattle have been fed only grass silage as roughage with no ill effects. Most dairymen who feed grass silage feed a small amount of hay and as much grass silage as the cows will clean up. Herds should be fed after milking to avoid any chance of giving the milk a feed flavor which it may acquire if the cows get silage before or during milking.

Stack and fence silos have been used successfully in Humboldt County, California, and in the cheese-famous Tillamook section of Oregon. There, rye grasses and legumes. May crops of volunteer oats, or other succulent mixtures are stacked away with a flavoring of approximately 20 pounds of molasses to the ton, "to cause it to ensile properly." Experimental silos of six-inch mesh wire, lined with heavy paper, didn't work too well the first year. Since then, fence silos built with rings of two-by-four inch mesh welded steel, wood slat fencing or triangular steel mesh, interlocked and lined with fiber-enforced paper, have given excellent results.

Here again, the experts warn, care should be taken to keep the top of the silage level and well trampled. Two thicknesses of paper-lining should be used if the silage is to be kept from early summer for winter feeding. Silo tops, after two or three days of thorough trampling, are sealed with layers of paper and weighted down.

John Pickett, editor of *California Farmer* . . . a gourmet as well as a skillful farmer . . describes the resulting silage as "smelling like some salads, well spiced up with oils and condiments . . . a rather pleasant odor, though I didn't taste it. The cows like it. It's good feed, high in protein value, if the grass is cut early enough.

"Humboldt County," he adds, in soberer vein, "produces a great deal of feed per acre in a region of abundant rainfall. There are many farms where they feed 20 cows on 20 acres, and those 20 acres cut up into many paddocks will furnish all the pasturage and all the hay required. They have

(Continued on page 129)

COW DOG

BY ELIZABETH NICHOLDS

Training a cow dog can be an enjoyable experience as well as a profitable one. You gain a friend, and your dog becomes an eager hired hand.

THAT first summer on the farm I had been going after the cows night and morning until mid-July before I made up my mind that we must have either a hired man or a cow dog, and that a dog would be cheaper to keep.

Going after the cows should be one of the pleasantest tasks on the farm. In the first place, it does not strain the back, and that makes it almost unique in a way of life where everything one picks up is heavy. In the second place, it cannot be hurried, and a slow gaited job is restful after hours of trying to catch up. And finally, it comes at the very nicest times of the day, early morning when beaded spider webs still cling to the grasses, or late afternoon when the shadows lengthen across the pasture slopes.

But even in this idealistic setting, a philosophical attitude is frequently submerged by the effort to wake up or the fatigue after the day's work. Take that morning in July. Having overslept, I scrambled into my clothes and rushed downstairs to find there was no coffee left over from the night before, and no time to make fresh. As a consequence, I set out after the cows feeling chilled, hungry, and flurried. They were not to be seen from the pasture gate, and I had to hunt for them, locating them, naturally, in the lower southeast corner. From this spot, fetching them in involves directing them up a steep path, so narrow that they must walk single file. As soon as the ambling line is formed and started up the path, the lead cow is sure to see some choice tuft of grass and the cows behind her block my attempts to give her the poke she deserves. The whole procession must wait while she munches.

On this particular morning, the situation was aggravated by the attitude of Jean the Guernsey, who wanted nothing in the world but the attentions of my neighbor's Holstein bull. She circled yearningly back to the line fence time and again. Though no speed demon, an impassioned cow can move faster than a man can run, to say nothing of a woman, and it took me

three quarters of an hour of exasperated scrambling through swampy underbrush to get both Jean and the other indifferent cows headed up the narrow path. By the time they were in their stancheons my disposition was such that it is a wonder the milk didn't curdle in their udders.

That afternoon I started correspondence aimed toward securing a Border Collie who could help bring the cows from pasture.

That's the Dog for Me

The Border Collie, a remote country cousin of the aristocratic, narrow-headed Collie of the bench shows, was the logical choice for me. This breed has its own registry run by the North American Sheep Dog Society in Wooster, Ohio, but to secure a registration requires more than just a pure blood line. Not only must both parents be registered dogs, but each individual must pass a performance test before he can be registered. This rule helps maintain the standard of intelligence of the breed and, as a beginning dog trainer, I wanted to be sure I was getting an intelligent dog that had the instinct to herd bred into it.

When I put down my money I was assured that I was getting the inherited instincts, brains, and trainability of generations of selective breeding. I was also certain that both the puppy's parents had passed the field tests devised by practical stockmen. All this was a break for me, but the poor puppy had no chance to look over *my* pedigree ; she had to accept me on faith.

Like The Book Says

I had read a number of books on the subject of dog training and had listened carefully to dog owners whose disciplined pets proved that they knew what they were talking about. I felt that I had acquired a fairly good theoretical knowledge on the subject, but the round eyed puppy staring up at me made me feel sure that I would learn more from her than I had from any book.

The first thing she must be taught was to recognize her name, but that was easy. Any puppy is conceited enough to accept a name, repeated often enough and accompanied by pleasant pats on the head, as belonging to her and to her alone. I named my dog June because she was born in June and, in short order, she showed by tail wagging signs that she knew the name was hers and had accepted it.

I had my own theories about dog training, based chiefly on one fundamental rule —love your dog and let him know it. Dogs, like humans, must learn socialized behavior, but with dogs as with humans, punishment is hardly ever the way to teach it. The more completely the owner can represent the factors of god, love, social life, food, work and play to the dog the more important it becomes to the dog to please his owner.

There are a few lesser, if more specific, rules that I found were important to follow: (1) Don't expect more of your dog than his intelligence is capable of grasping, and not too much more of him than is agreeable to his canine instincts. (2) Be consistent in your demands and in the signals you use for conveying your orders. (3) Remember that a dog learns only by association.

Take, as an example of teaching through association, the business of persuading your dog to lie down on command. You start by pushing down on the puppy's rump and pulling forward with the fore paws so that he has to go down. While you are doing this you use the word or gesture or whistle, or whatever signal you plan to use in the field to get your dog to drop. I didn't have to do this more than half a dozen times before June began making the connection between the signal and the act of dropping and would perform the trick without the persuasion of my hands.

Inducing the dog to stay down for more than a split second is a horse of quite another color, and this is where your relationship with your dog comes in. He will hold the pose only if he is afraid of future punishment, or if he is looking forward to your approval. Unless you are a born sadist, you will find it more fun to work through affection than through fear. With patience and training you should be able to get your dog to drop on signal while he is at a considerable distance from you, and to remain down until you release him. Obedience to this command is a handy trait in any dog, and is a must for any working dog.

When you set out on the serious business of teaching your dog to come on call, put him on a long leash—twenty feet or so, if possible. Tell him to "down"; then retreat to the end of the leash, face him, and call. using his name and the word or signal you always plan to use to call him to you. Then give a quick, smart tug at the leash to start him, and bring him in, hand over hand, running backward away from him as you do so. Your movement away from him will tend to induce him to follow, and your tugs on the leash will discourage procrastination. If you do this daily for a sufficient number of days, you will probably take some bad falls as you trip over the garden bench or back into the barn door, but the dog should get the point. A slip chain training collar that pinches when you tug at the leash will help establish the habit of prompt obedience. This habit is a useful reinforcement to his love for you.

June, the Instinctive

June was as wilful and muddle-headed as puppies generally are, but she was smart and affectionate and eager to please. She learned the A.B.C.'s of infant dog behavior readily enough. In addition to these fun-

TRAINING BEGINS with a christening. The dog is given a name and is then taught to respond to it. The formal training usually begins at three months of age.

JUNE WAS GIVEN a thorough inspection by the cows when she was introduced to them, the first step in her training as a cow dog. The leash prevented an early injury which might have made her fear them and ruined her career as a herd dog.

damentals, however, June must learn sooner or later the technique of her job in life. It would help quite a lot, I thought, if I knew more than she did about it to start with. Or even as much. But for me it was trial and error.

I thought she should learn her way around the pasture where later she would work for her living. But I was also afraid that any injury inflicted by a cow while June was too young to take care of herself would make her so timid she would never drive cows successfully. So I took her with me night and morning to pasture, but I kept her on leash, ready to snatch her out of harm's way. This, unhappily, taught her to cling too close to me, a habit not to be regarded with favor in a dog who would eventually be expected to go out alone after the cows while I waited comfortably at home.

At first, my introduction to the pasture worked very badly indeed. Cows are curious folk, and they stopped in their tracks to stare at June, or came toward us, heads lowered, to peer near-sightedly, refusing to move away while June remained on the ground. In order to make the cows go ahead of us to the barn, it was necessary for me to carry June, for once she was in my arms she became, apparently, part and parcel of my anatomy, and accepted as such by the cows.

But how, I wondered, at this rate, would I ever teach my new cow dog to run ahead of me, collect a group of large indifferent cows from some distant point, and drive them to the barn. I couldn't think how to start. Then, one afternoon, when we were going for the cows, the snap on June's leash gave way. She had probably been free for some moments before she realized it. We both saw the dragging leash at the same moment. June gave me one look, started like a bat out of hell toward the cows, circled them barking, and drove them rapidly and neatly to the barn while I stood in my tracks and felt like a fool. June had come of age. June was a cow dog.

But let no one think that my training troubles were over. June had demonstrated that she was a driving dog by instinct. I would never have to teach her to drive cows. I would only have to teach her where to drive the cows, and which cows to drive, and how fast.

There are various blemishes of character which lead a prospective cow dog out of the narrow paths of cow dog virtue, such as submitting to the temptation to depart on hunting expeditions while the farmer waits trustingly at the gate for the cows the dog is supposed to be bringing in; or trying to sneak back home to the kitchen fire instead of rounding up cows out of the chilly fog on a fall morning. But June showed a praiseworthy singleness of purpose, and she was persistent, ambitious, and serious minded. However, she did all of the wrong things that might be expected from humorless, inexperienced, energetic youth. She drove the cows too fast, to the detriment of the milk supply. She sent them accidentally in the wrong direction, got rattled, and snapped at their noses in a frantic effort to correct her error. She couldn't tell the difference between a cow and a horse, and tried herding everything in sight, an error in judgment that resulted in a badly bruised shoulder when a horse struck at her. However, she meant well, and gradually she slowed down, and little by little, what with being praised for some things and scolded for more, she gradually learned what she was supposed to do and what she was supposed not to do.

My Closest Friend

As the weeks went by, she improved in the technique of her job. Also, she was my almost constant companion, and bit by bit, she and I fitted our lives together, each of us learning where allowances must be made. There were, to be sure, aspects of

my life in which June could have no part, but then, she, too, had her reservations. She would, for example, roll in foul smelling messes, and gaze at me with enigmatic, unrepentant eyes when I expressed my opinion of the odoriferous result. She was senselessly jealous, and attempted mayhem on any dog, cat, or child toward whom I offered my hand. She held her love life as her own, and only periodic restraint under lock and key prevented disastrous eventualities.

As a household guard, June was a joke. She would bark to inform us that the pig was out again, or that the heifers were where they should not be, but a stranger could walk into the house at any hour of the day or night, and June would only try to kiss him.

However, I had got her because I wanted a cow dog, and cow dog is all she was. She would go berrying with me, however, and learned to pick berries faster than I could. She knew very well the difference between the sour green ones and the ripe sweet ones. Most of my berries went into the pail; all of hers went down the gullet. But she played fair. She never ate what I picked. In March she helped gather sap in the sugar bush, racing off through the trees, and racing back to watch me as I tended fire in the arch.

After sap gathering time, came the warm days, when the hum of bees hung like a visible haze above the locust trees. Pastures smelled of blue grass and clover, and were freckled thickly with buttercups and paint brush or drifted over with the light snow of daisies. Twice a day now June went with me to bring the cows to the barn. I did not oversleep these mornings because June, quite as reliable as any alarm clock and infinitely more persistent, would continue to burrow under the covers to lick my face until I gave up and emerged. Then she and I would start out together for the cows. If I could see them from the pasture gate, I would keep June at heel while we went toward them. Often they would be standing under the oaks at the high northern edge of the pasture, and then I could pause when I reached them to look down across the valley. The mists would still be lying in the low land, while the hills beyond hung baseless in a filmy sea. The nearer trees would be floating, one beyond the other, silent and ghostly.

The cows are in no hurry. They munch while I gaze, and June stands beside me, sniffing the morning air, a little restless and eager to get going, but restraining herself to my mood. When the deliberate procession starts toward the barn, June is officious, assuming all responsibility for keeping the ambling cows in line and headed toward the gate. Bringing in the cows is no longer a chore, but is what it always had the potentiality of being, a pleasant walk at a pleasant time of day.

The hot days of summer come and go. June's work becomes more important, for

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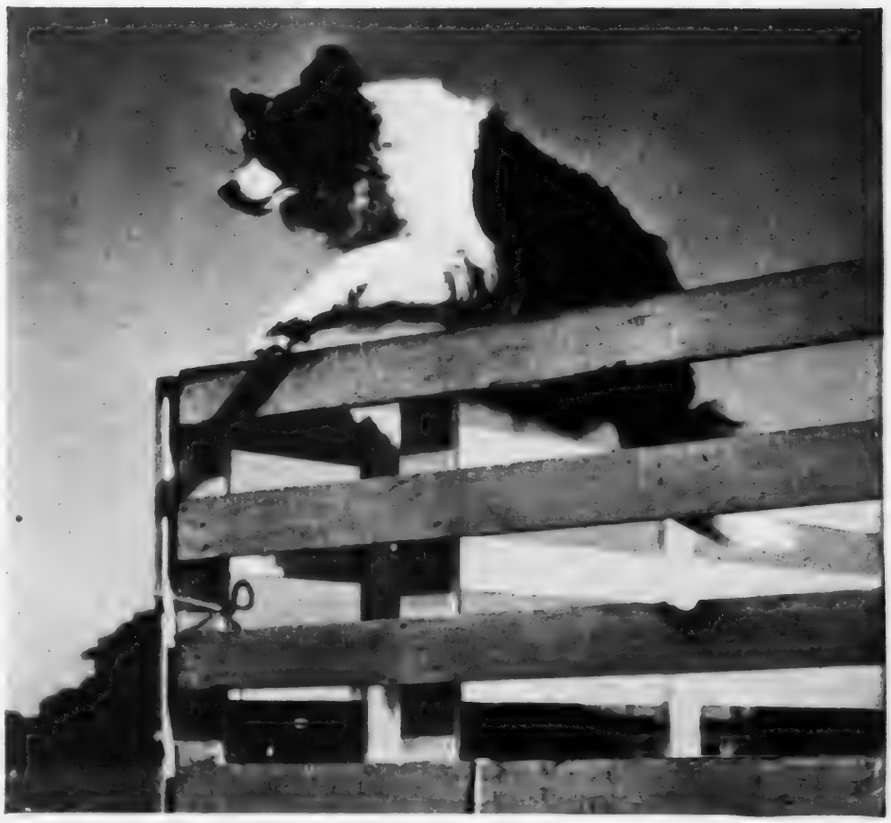


JUNE'S PARENTS were registered working dogs which means they had proven blood lines and had passed practical performance tests. Most of the breed are used as sheep dogs but the herding instinct makes them valuable with all farm animals.

A PERVERSE COW will always find business at the far end of the pasture when you want her to head for the barn. It is at times like this that the working dog earns his keep. A young dog may drive them too fast, but age will slow him down.

New Work For BUCKWHEAT

BY JOHN P. ARNOLD

Buckwheat, old favorite on the breakfast table, is a good livestock feed when corn fails. Now scientists are finding new jobs for it.

BUCKWHEAT is persistent but not spectacular. It has been grown in this country since colonial times, but it has never won a popularity contest. It has plugged along year after year, getting planted on a smattering of farms and eventually finding its way into buckwheat cakes on the family breakfast table, or into livestock feeds. Buckwheat has been called a poor man's crop; its main role has been that of a pinch hitter for other grains.

Within the past few years, however, it has merited a second look from both farmers and scientists. Scientists have learned that buckwheat may be our best source of rutin, an important medical substance. Farmers, too, have found that this grain has some good points. In wet years when rains fall right on through corn planting time and make a corn or oat crop an impossibility for the season, buckwheat can come to the rescue. Because it will mature a crop in 50 to 85 days after planting, it can be planted as late as the middle of July and mature before the first killing frost. The grain, while not as good for feed as corn, makes an acceptable substitute. Farmers who keep bees have learned that buckwheat makes good bee pasture, and many of them plant a strip of buckwheat to keep their bees happy.

In addition to these points in its favor, buckwheat has the ability to get along on thin soil. After other crops have drained a field of much of its fertility, buckwheat can make use of the small quantities of minerals that might be left. This has given buckwheat its reputation as a poor land crop and led to planting the grain where it should not be planted, or planting it carelessly and expecting a good harvest. As a green manure crop, however, it will grow on thin soils and the minerals that it scavenges from the soil can be returned in a form that more exacting plants can use. Buckwheat grows rapidly, often reaching a height of a foot or more within a month after planting. This characteristic makes it excellent for weed control, and it has been put to work in many places in the fight against quack grass.

Historically, buckwheat is a youngster in our part of the world. It was apparently unknown in the early Greek and Roman civilizations, and didn't show up in Europe until the sixteenth century when some inquisitive traveler brought in a bag full of seed from China where it had grown on the high plateaus for a thousand years. It gradually became a staple food for man and beast in Russia, Japan, Poland, Germany, Austria, and France where it is still popular.

Buckwheat's rise in popularity in this

country started in the late 1800's when long lines of European immigrants were reaching our shores. When the tide of newcomers died down, buckwheat's popularity died with it. The emigrants gradually adopted the eating habits of their new country and today there is only a "stack of wheats" to tell us that there was ever any difference.

Late in the 1860's we were planting 800,000 acres to buckwheat every year. Not until the first World War did the production drop off noticeably. By 1945 we were growing only 462,000 acres and held fifth place among the countries of the world in buckwheat production. Today, for every bushel of buckwheat that comes off American farms, we produce 300 bushels of corn, 150 bushels of oats and 100 bushels of wheat. The American people eat about a million bushels of buckwheat a year, save a half million for seed, and feed what is left to livestock.

Buckwheat, however, faces a future that is not too gloomy. Within the past few years we have shipped large tonnage abroad and according to present plans this export will continue. Of even greater promise is the fact that buckwheat is a source of the medically valuable rutin.

What Is Rutin?

Rutin is a drug extracted from the leaves and flowers of the buckwheat plant. Doctors administer rutin to strengthen the small capillary blood vessels that reach every part of the human body. Diseases such as apoplexy and hypertension may cause these blood vessels to burst, unless rutin is given to the patient to help strengthen the capillary walls.

Military men have also become interested in the drug for it has a value in treating frost-bite, trench foot, and radiation injuries. If rutin proves its value in preventing or curing radiation injuries, buckwheat may take an important place in the atomic age.

Rutin has been found in about 40 kinds of plants. It was originally extracted from expensive flue cured tobaccos at a raw material cost of about $140 a pound. When USDA research men devised a method of extracting rutin from buckwheat they reduced the raw material cost to about $1.10. Commercial extracting plants have already been set up to extract rutin from buckwheat, but farmers should not accept this as evidence that buckwheat is the crop of the future. There is a constant laboratory search being conducted for other plants that may supply more rutin than buckwheat does.

Cecil Fryman, who farms 225 acres near Mt. Healthy, Ohio, grew rutin buckwheat for two years. "A drug company near here wanted to do some experimental work with rutin," he said. "They came out and contracted with me to grow three acres for two years for them. I grew two crops each year on the same field. They wanted it

(Continued on page 125)

BUCKWHEAT may be the stepchild of agriculture, but it can serve as a valuable green manure crop or a source of honey for bees. It grows thick enough to blanket the field and choke the weeks. Because it loosens the soil, it may speed up erosion.

NOBODY LOAFS when the buckwheat is down. Grown for rutin, it must be delivered to the dehydrating mill within a few hours after cutting. A mower with a windrowing attachment, and a field chopper are the best tools for harvesting.

THIS FAMILY PICTURE of the flinty, angular seeds, of the four varieties of buckwheat includes (top, left) Tartary, (right) Japanese; (bottom, left) Silverhull, (right) Common Gray. Tartary is grown for rutin. Gray is mixed Japanese and Silverhull.

How Much Grass?

Grass has become a full-fledged crop on many farms. Here is the method of figuring how much should be in your rotation.

BY C. M. LONG

THE PROBLEM today is not, "Shall there be grass?", but "How much grass?"

In the farmer's mind, as he seeks a way to hold on to the vanishing fertility and slipping top soil of his fields he finds two methods, both of them as old as the hills around him. The first is grass. The second is by mechanical means, such as contour farming, strip cropping and terracing.

This article and its accompanying chart on page 59 offers a practical way to determine how much grass to plant on your farm. Some farms can profitably "Go To Grass" entirely, as suggested in the article by that title in *Farm Quarterly* for Winter 1947. Others should introduce it into their rotation.

To know how much land to put into "grass", we first want to decide what we mean by the word itself. Then we should know "why we need grass?"

If an agronomist talks about grass he means such plants as timothy, red top, blue grass, brome grass, and a large list of fine and shallow-rooted plants. They are non-legumes. A soil conservation man thinks of grass as any useful plant that will cover the ground. His definition includes both the above grasses and the legumes, such as brome grass, timothy, and sometimes includes small grains like rye or barley, as well as alfalfa, sweet clover, ladino clover and all the other clovers. I use the word in its general sense.

Grass and Profitable Farming

The answer to our second question, "Why do we need grass?" is tied up with soil fertility and water control.

No one, so far as I can learn, has ever found a way in a general farming area to either increase or maintain soil fertility without the use of grass. And grass plays an important part in water control. If the land is inclined to be wet because of a compacted soil condition or from tight subsoils, deep-rooted plants like sweet clover or alfalfa will penetrate this tight structure and let the water out and the air in. Many fields have had their drainage so greatly improved by these crops that expensive tile lines were found unnecessary.

If rainwater cannot penetrate the soil quickly, it must run off like water from a tin roof. As it runs off it cuts the soil and carries away a part of it. The amount it carries away depends upon the velocity of the water. Deacon, an English Civil Engineer, states that when the velocity of running water is doubled it can carry 32 times the load of material it carried at the slower speed. If a given volume of water flowing at one mile an hour carries away one truck-load of soil, it will carry 32 truck-loads at two miles per hour. If the velocity is trebled, it can carry 243 truck-loads. Deacon shows that not only does the amount of soil-loss increase with the speed of the water but the size of the particles carried off also increased astonishingly. The ability of water to tear up the soil increases so much that if it were only carrying grains of silt at one mile per hour it would carry stones 729 times as large at three miles per hour.

Because of the cutting effect of water it is necessary to plant mixed grasses, even on gentle slopes, to prevent erosion and control the water. Alfalfa, one of our very finest forage plants, grows in bunches. Water runs between these bunches and will carry away much of the good topsoil if brome or similar grass is not growing in between. Ladino clover will cuddle up to both the alfalfa and the brome grass, completely covering the soil.

Grass Stops Erosion

Grass can be used to arrest erosion, even on very steep slopes. If there is sufficient land in the farm to enable the farmer to

EXPLANATION OF CHART—Think of this chart as a cross section of the country, starting at the river and gradually proceeding away from it. Ordinarily, the land is level bordering the river and gradually rises and becomes more uneven the greater the distance from the river.

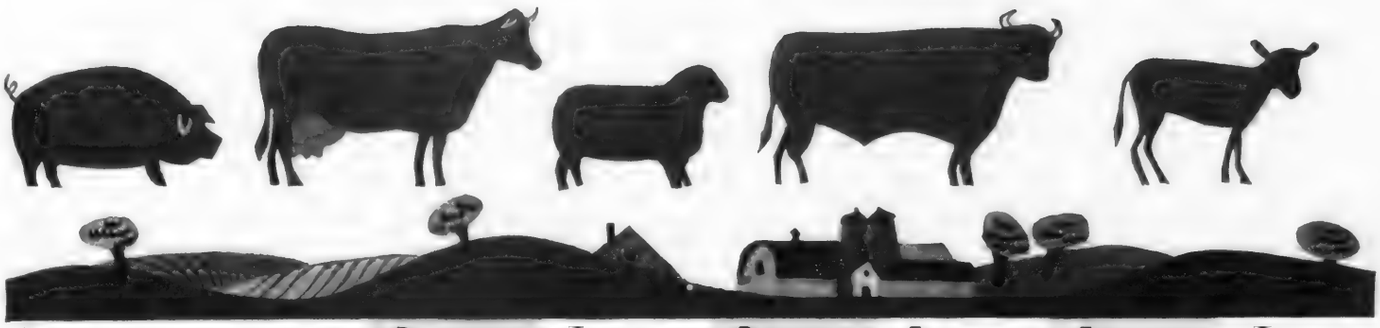
Profile 1 is perfectly flat; the slopes increase and become more uneven the higher the numbers go. We seldom find a farm in which all the land has just one slope. Nor do we find many fields where the slope is all the same. However, fields on the farm should be laid out so that the entire field has, as nearly as possible, the same slope. While the slope is not the only factor to be considered in laying out the fields of a farm, it is perhaps the most important factor. When we lay out a field according to slope we tend to put soil of the same type together. Of course there are exceptions to the rule of using slope to determine land use, such as in the hilly Cincinnati type soil in southern Indiana which has been growing tobacco for 20 years.

Column A, then, shows the degree of slope, with eight profiles.

Column B shows the maximum per cent of the land which may be put in corn if erosion is to be slowed down. If more land is put into corn than shown here, the soil will be "sold down the river."

Column C shows the minimum per cent of land which must be in grass if erosion is to be arrested, and the nitrogen and organic matter is to be maintained.

(Continued on page 60)



A DEGREE OF SLOPE	B MAXIMUM PERCENTAGE OF CORN IF EROSION IS TO BE ARRESTED	C MINIMUM PERCENTAGE OF GRASS REQUIRED TO HOLD THE SOIL	D ROTATION	E *ANNUAL AVERAGE PRODUCTION (Per 100 acres of crop land)	F KINDS OF LIVESTOCK SUITABLE	G CERTAINTY OF INCOME
1. level (bottom land along streams)	100%	0%	Corn	Corn 6000 bushels, no oats, no pasture or hay	Feeding heavy cattle, fattening hogs, using more cattle than hogs	Highly Speculative
2. one degree	50%	20%	Corn, oats, (sweet clover seeded in oats)	Corn 4500 bushels, oats 2500, no hay or pasture	Same as No. 1, above	Speculative
3. two degrees	50%	25%	Corn, Corn, oats, mixed clover	Corn 3750 bushels, oats 1250, hay and pasture 25 acres	Fat hogs and western calves, lots of hogs and few calves, or dairy cattle	Fairly certain
4. three degrees	33%	33%	Corn, oats, mixed clover	Corn 2700 bushels, oats 1665, hay and pasture 33 acres	Fat hogs and western calves, about same number each, hogs on green pasture, or dairy cattle	Fairly certain
5. five degrees	25%	50%	Corn, small grain, 2 years mixed alfalfa	Corn 2000 bushels, oats 1250, hay and pasture 50 acres	Western calves; or dairy cattle	More certain
6. seven degrees	20%	60%	Corn, small grain, 3 years mixed alfalfa	Corn 1600 bushels, oats 1000, hay and pasture 60 acres	Hogs, dairy cattle, beef calves, or sheep	More certain
7. ten degrees	0%	80%	Small grain, mixed alfalfa or lespedeza	No corn, oats 1000 bushels, hay and pasture 80 acres	No hogs, dairy cows, western calves, or sheep	Certain
8. ten degrees plus	0%	100%	Mixed alfalfa, lespedeza, or bluegrass and birdsfoot trefoil	No corn, no oats, hay and pasture 100 acres	No hogs, beef cows, dairy cattle and calves, or sheep	Speculative

*Based on crop results of Farm Clinic Clients on many thousand acres in the Midwest.

EXPLANATION OF CHART

(Continued from page 58)

Column D shows rotations that can be used on the various slopes. Since corn is the great yardstick for the Midwest, we have put as much corn in these rotations as the land will stand if erosion is to be arrested.

Column E is comparative production on 100 acres of tillable land if properly handled.

Column F shows the kinds of livestock most suitable to the crops grown on the various slopes. No attempt has been made to show the number of livestock the land will carry. In some cases hogs, beef cattle, dairy cattle and sheep are all suitable.

Column G gives the comparative certainty of income.

LAND USE FOR DIFFERENT SECTIONS

Profile 1. We think of this as being the bottomland of the country, land that overflows frequently. There is not much that can be done with it save put it in corn, or a crop of soybeans if the season is too late for corn. The soil would profit by having sweet clover seeded in the corn.

We might have level bottomland so wet that corn would not grow and a grass program would have to be used here. If so, it would have to be a wet-land grass such as reed canary grass.

Profile 2. Here we have a similar type of soil, but it seldom overflows. It is good, rich soil, and a rotation of corn and oats; with sweet clover seeded in the oats and permitted to grow throughout the summer it will keep up the fertility of the land indefinitely, provided lime, phosphorus and potash are replenished.

Profile 3 is only slightly more rolling than Profile 2. Twenty-five per cent of the land in grass will protect it. This will leave 25 per cent for small grain and 50 per cent for corn—or corn and soybeans if the erosion problem is not serious.

Profile 4. Here the land is a little more rolling and must be in grass at least one-third of the time. A good rotation is corn, oats and mixed clover with proper lime and fertilizer. Where there is some way to get the fall grain seeded in the corn, the operator has a choice between wheat, rye, barley, and if far enough south, even winter oats.

With Profile 5 we are beginning to get into land that has considerable slope, and it will be necessary for it to be in grass two years out of four. None of it should be in corn more than once in four years. Up to this point the operator has a choice between turning down the grass as green manure or using livestock on it. Lime and fertilizer must be used in required quantities. Where the land must remain in grass two years in succession, there is no practical way to get the benefit from this extra grass without using livestock. Two years of grass in succession adds little more nitrogen than if the grass were turned down after one year's growth. The

(Continued on page 108)

keep these slopes in grass and small grain all the time, the owner can forego the profits that come from growing corn and make a good living growing grass and feeding it to livestock. Where the owner has only 40, 60 or perhaps 100 acres, the farm is so small that he must have both the profit that comes from the growing of corn and grain as well as that which comes from growing livestock. Under this condition, it will be necessary for him to contour farm, strip crop and build terraces, or perhaps do all three. Where "clean-cultivated" crops like corn or soybeans can be eliminated, that will solve the erosion problems.

With wet land we have another problem; it will not permit the growth of bacteria which break down and make available the elements of fertility that are naturally in the soil.

Wet ground will not let the plants breathe and get oxygen and carbon dioxide they need for growth. That is the reason there is always a hole in the bottom of the flower pot. If you doubt the necessity for this, try taking a tin pail which has no hole in the bottom, fill it with dirt and put a good plant in it. Then water it from day to day. At first it will thrive, but in a short time the soil will become waterlogged and the plant will die. It is a waste of time and money attempting to build up soil only to let water carry it away, or let the plants on wet land die for the lack of oxygen.

It Tames the Rain

There is another benefit derived from grass which we should consider. When a rain-drop falls on bare, loose soil it pelts the land and beats or compacts the soil. This hammering causes the soil to run together, making a layer of puddled soil over which later rain-drops run as over a sheet of metal. If the rain is gentle the effect is not too bad. However, many of our rains come in a downpour. When the field is covered with grass, the force of the falling water is broken by the stems and leaves. If the cover is made up of the right combination of grasses the water is let down upon the soil itself in a gentle mist, regardless of how heavy the downpour.

The second step in building or maintaining soil fertility, that of increasing the nitrogen and increasing the organic matter, also depends upon grass. Legume crops are heavy consumers of nitrogen. The best source of nitrogen is, of course, the air. Outside of the small amount of nitrogen converted into a usable form by lightning this nitrogen supply can be converted into usable form for plant use only by leguminous crops such as the alfalfa and clovers. It takes about a pound of nitrogen to produce a bushel of corn. and a little more for a bushel of wheat. To make a pound of nitrogen available, 20 pounds of organic matter or decaying vegetable matter must be present in the soil and decomposing, which is a chemical process similar to burning, only slower. Thus, when we produce 100 bushels of corn we destroy one ton of organic matter for the ears of the corn. A half pound per bushel more is destroyed if the stalks are burned. Additional organic matter is destroyed because clean cultivation exposes the ground to the sun's rays. If the corn is sold, it is the same as selling a truck-load of the very finest top soil. Few farm owners would let a truck-load per acre of their finest soil be carted away at any price.

Adding Organic Matter

However the picture is different if the farmer is growing grass. If hay is used for animals the manure resulting is returned to the soil.

In addition the roots of the plants produce many more tons of organic matter when they decompose at the time the land is plowed.

When a mixed alfalfa and brome grass is growing in a good stand as much as eight tons of organic matter is returned to the soil per acre.

The organic matter resulting from the growing of mixed grasses and legumes does much more than make nitrogen available. It enables the soil to absorb great quantities of water during wet weather and hold it far into dry weather.

Furthermore, organic matter provides a home for the bacteria and fungi of the soil; there are billions of them in a teaspoonful of soil which is well filled with organic matter. Nitrogenous organic matter provides food for these bacteria and they digest the elements of plant food found in the soil and make these elements available to plants. It was once thought that plants absorbed their food directly from the moisture in the soil. It is now known that this is not entirely the case. The plant's food is transferred from the particles of soil by an exchange of electrically charged positive and negative particles. The plant's roots have an abundance of hydrogen which is negative. Clay or organic particles in the soil have a negative charge and they hold on to calcium, potash and magnesium which have positive charges. The plant trades hydrogen for these positive plant food nutrients.

The small particles of clay and organic matter are the only particles in the soil that can hold these positively charged elements. The land owner has nothing to do with the amount of clay that is in his soil, whether it is much or whether it is little. However, he can control to a large extent the amount of organic matter in the soil. Fortunately, the carrying capacity of these plant food particles in organic matter is two and a half times as great

BIRDS, animals and people get more to eat from fertile land. The oldest and easiest way to build up the soil is with grass. With grass the soil gains rich organic matter, the top soil stays in place and moisture is held far into the dry summer months.

as that of clay. And, phosphorus is held in the soil in a more available form in the presence of organic matter. Thus, a man with clay soil can greatly increase the plant food carrying capacity by introducing organic matter. The man with sandy soil has no other way of increasing the fertility, holding capacity of his soil, aside from introducing organic matter. The most practical way to increase organic matter is by means of growing grass and returning it to the soil in the form of green crops, turned under, or by turning under the manure derived from these crops when they are eaten by livestock, either green or in the form of hay.

Recently it has been discovered that some, and perhaps all, of our plants have yet another way of transferring plant food from the soil to the plant. That is by means of what is known as mycorrhiza. This is a mold-like filament found only in soils that have an abundance of organic matter. These filaments act as a bridge across which the elements of plant food travel from the soil to the plant.

Clay soils and clay subsoils are usually rich in the elements of potash and phosphorus, but they are in a form that, to a large extent, is unavailable to plants. These elements are locked up in the soil like corn in a well-protected crib. Organic matter unlocks the door and permits the plants to feed upon the food.

How Much Grass?

Personal experiences in working with farms covering thousands of acres in the Midwest have proved these statements. We can see that grass is an absolute necessity on every farm if its fertility is to be maintained and we are to continue profitable farming. Almost any farmer can profitably grow more grass than he does. Quite a few farmers make as much or more money as they are now making by growing nothing but grass. However, if most of the farmers were to undertake to grow grass exclusively, our agricultural economy would be upset. Of course there must be grain grown, such as wheat, rice and many other grains for human consumption. There must be grain such as corn, oats and soybeans grown to fatten livestock and give the meat a better flavor. The growing of a combination of grains and grasses distributes labor and helps the farmer keep his labor profitably employed to a greater extent throughout the year. It is for these reasons that the question of how much grass becomes a highly important one. The desirable amount of grass varies from community to community, from farm to farm.

A quick method by which a farmer can determine how much of the time each field of his farm must be in grass if its productivity and profit are to continue at a high level is given on page 59.

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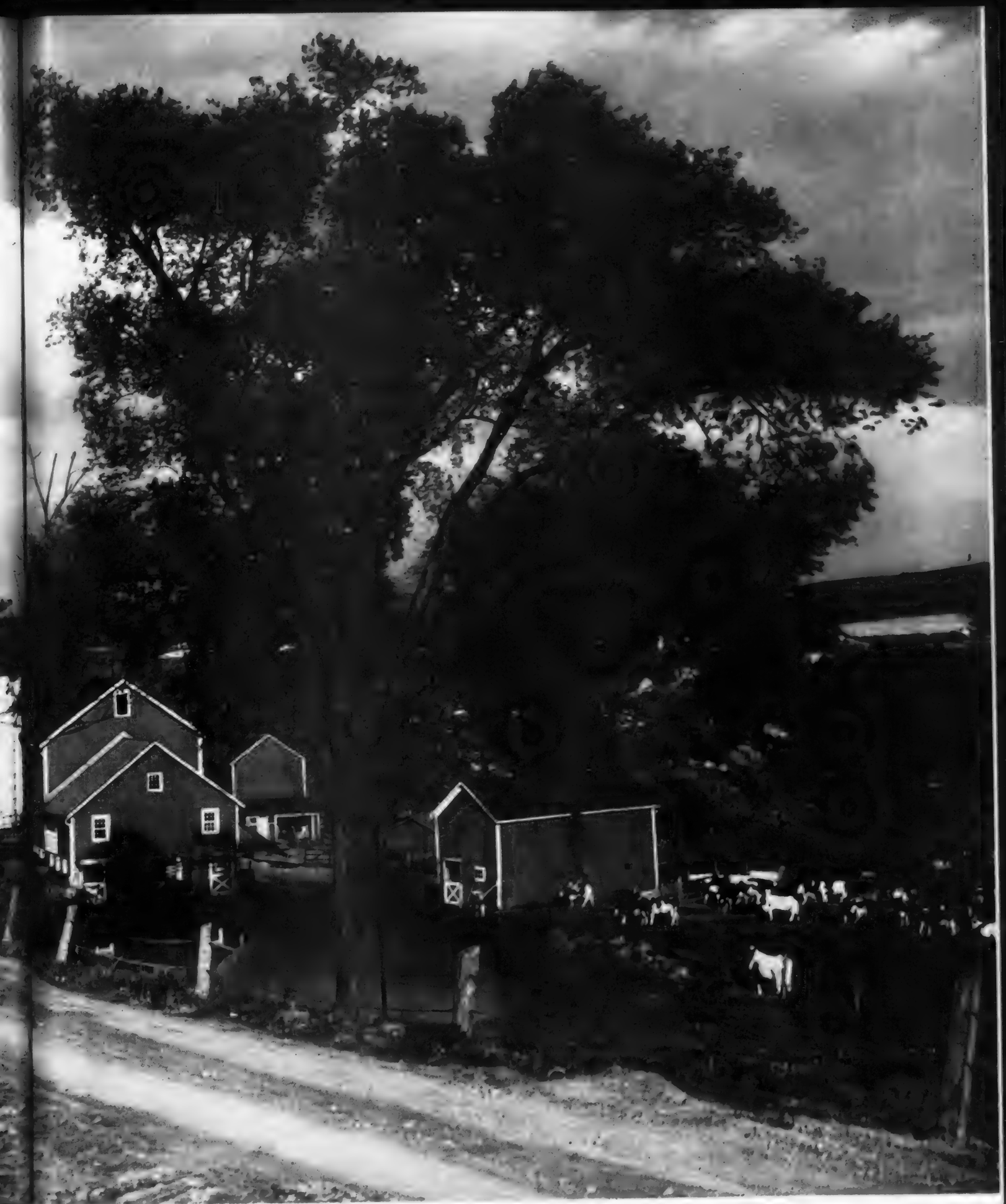
SOME FARMS should never grow corn. The degree of slope and the type of soil are determining factors. On hilly farms like this one the silo can still be filled by making the ensilage of grass.



THE GOLDEN BEAUTY of the sunflower is one thing that keeps James C. Curtis planting around 40 acres to the crop each year. Another, more practical reason is that year after year sunflowers have equaled or bettered the cash returns he has made on his corn crop. Crows are his worst pests; they love both crops.

Sunflowers

BY GRANT CANNON

The native sunflower has returned to the Western Hemisphere as a cash crop. Farmers grow it for poultry and bird seed and for forage, but the new market is for its excellent oil and nutritious meal.

LIKE the local boy who left home in overalls and clodhoppers and later returned driving a Cadillac, the American sunflower took an ocean voyage centuries ago as a weed and came back a cultivated plant. Its travels took it through Europe as a garden plant and into Russia where it became a confection. The Tzar's kulaks found that the roasted sunflower seed was as satisfying to them as peanuts are to a baseball fan, and the revolution didn't change the Russian's taste for the fat gray seeds. By selection and crossbreeding, the Russians improved the plant and made it into a commercial crop.

Even the austere Mennonites enjoyed eating the sunflower seed. When they left Europe to seek a more congenial home in America they brought with them the seeds of the cultivated Russian sunflower. They grew a few in their gardens just as a farmer today might put in a row or two of popcorn for the kids.

The American farmers took up the crop to supply a small but steady market for the seed to be used as poultry feed and in bird seed mixtures. Later, when feed tests showed that sunflowers made good silage, the acreage was expanded. The vegetable oil famine during the war years caused the Canadian government, in 1943, to offer a subsidy to farmers to grow sunflowers for the production of high quality oil. A few farmers in the United States began growing sunflowers for oil in 1947.

Where Corn Gets Cold

Taming the sunflower brought about a change in its appearance. The Russians, who seem to have a hearty distaste for branches or offshoots, selected and developed single stemmed plants that grow much taller than the wild species and produced a single large seed head. They did this without sacrificing its native hardiness which permits this golden headed plant to survive light frosts from the time it pushes up its first leaves until the harvest is in. The claim is also made that the sunflower will produce more oil per acre in semi-arid sections of the country than any other oil crop. All of the cultivated varieties that are being grown today have come from Russia or are crosses of Russian parents.

Proper cultivation should keep the land relatively free of weeds during the year and a spray of 2,4-D will knock out any sunflowers that volunteer the following season. It is not surprising that the beginnings of sunflower production for oil should be found in the northern portion of the spring wheat country, North Dakota, South Dakota and Minnesota. There is a real need for an inter-tilled crop in this region to control weeds, but the temperature changes and lack of rainfall make corn growing somewhat hazardous.

Giants and Dwarfs

The Russian Mammoth is grown for poultry and bird seed and also for forage and is, as its name implies, a gigantic plant growing to 15 and 18 feet, topped by its platter-sized head. Cut when its first blooms begin to show, this variety can be chopped into 10 to 13 tons of silage to the acre at a slightly lower cost per ton than corn.

The Mennonite sunflower is not a uniform variety since it has been developed by countless individual garden growers who have made their seed selection on the basis of their own personal preference. The average plant of this family is much shorter than the Mammoth, its seeds are smaller, but they have a higher oil content. Still shorter is Sunrise, which is an oil-rich variety introduced from Russia in the 1930's.

The Canadians have produced the only hybrid so far by crossing an inbred line of

THE RUSSIAN MAMMOTH variety will grow to 20 feet when widely spaced. John K. Baldon grows them in his strawberry patch for shade. This variety produces seed for poultry and birds and forage for cattle.

Mennonite with Sunrise. This hybrid, called Advance, produces a near black seed with a higher oil content than that produced by either of its parents and its total seed yield is very high. Advance is also shorter than either of the parent plants, which makes it an easier crop to harvest.

The North Dakota Experiment Station is working on the sunflower and, though they have not yet released any new varieties, they have developed some dwarfs that are only two and a half feet tall. If any of these plants prove successful in other respects their size will do a lot toward simplifying the harvesting problems.

Today the recommended varieties in the order of their preference are: Advance, Advance 2nd generation (the seed from the hybrid which does not have the full hybrid vigor but is still superior to its nearest rival), Sunrise, and Mennonite for the oil producing crop and Russian Mammoth for poultry and bird seed and for forage.

Curtis has 19 Acres

A sunflower grower of long standing is kindly, aging James C. Curtis who retired from the practice of law several years ago to live on the old family farm at Waldron, Indiana. In the past Curtis has raised as much as 40 acres of sunflowers, but this year, because of labor shortages, he has had to cut down his crop to 19 acres.

"This land through here is good for sunflower growing," Curtis said, pointing across his own fields to the west. "It's nice sandy loam. There is a strip of rich land right through here that had a natural cover of ash, black walnut and yellow poplar before it was farmed. When I was a boy I saw poplar stumps that were five and six feet in diameter right on the place. Though sunflowers will do well on almost any kind of soil except poorly drained, cold land, they seem to do best on the sandy soils.

"Preparing the land for sunflowers," Curtis continued, "is the same as for corn, plowing, discing and harrowing to make a firm seedbed that will hold moisture. This year I had a terrible time getting help and we didn't get the sunflowers in until June 18 and 19, but usually we try for the last part of April or early in May, depending on the weather. We plant in 38-inch rows with about a six-inch spacing between plants. With the soil moisture we usually have we can plant the seed from an inch to an inch and a half deep, but if we had a dry year we could go as deep as four inches and still get a crop."

Curtis, who raises sunflowers for a feed crop for birds, grows the Russian Mammoth. He has considered growing the crop for oil production, but feels that it would be foolish to do so until the market for this type seed is more general. At the present time, the oil seed market is in Minneapolis. Curtis secured his seed for planting from the McCullough Seed Company where he sells his crop after harvest. If he were to try raising Advance or Sunrise for an oil crop he would have to get seed from Cargill, Incorporated, in Minneapolis or from the Canadian growers through their Co-op Vegetable Oils Limited in Altona, Manitoba, Canada. The planting, cultivation and harvesting of the crop would be the same.

Farmers make an effort to knock out the weeds both for the sunflower crop and to protect a following grain crop. The soil preparation should kill the first weeds and give the plants an even start with the others, but many farmers give the weeds a further handicap by cross harrowing their fields before the sunflowers emerge and again before the plants reach the four to six leaf stage. A light wooden harrow is used to drag across the rows of growing plants. This operation is only done on warm, clear days when they will get the best weed kill and the least breaking of the sunflowers. The crop is row cultivated as long as the plants are small enough to get the machinery through without damage.

"I started Jake, my hired man, on the second cultivation when the plants were just knee high," Curtis said, "but before he could get through the whole field they had grown shoulder high and we had to withdraw the machinery. At that stage they grow so fast you can almost stand here and see them shoot up past you. Six weeks after planting they begin to form heads and at the end of two months the flowers start forming. At first the flowers turn toward the sun and follow it across the sky but gradually they all set on the stem facing the east. In the early morning, while they are still moist with dew, the sight makes up for all the hard work I put on them."

THE HEAD GROWS PRODIGIOUSLY after the seed is formed. This Russian Mammoth head measured 19 inches across, over three times the size of the oil-rich Advance.

The Harvest

After the petals of the bloom are shed the heads grow rapidly to accommodate the swelling seed. Stunted heads will be twisted and warped into strange agonized shapes by their seed. When their maximum growth is reached the seed begins to dry and harden. The seed is ripe when the seed coat is hard and dry, but this stage is reached two weeks to a month before the rest of the plant is in condition to be harvested by machinery. Dry weather and a few heavy frosts will take the moisture out of the pulpy head and still greenish stock and the crop will be ready for the combine. At this stage the moisture content of the seed should be down to 14 per cent or lower. Even the seed with 14 per cent moisture content may start to heat in storage, but if the farmer waits for the crop to dry out to the ideal 9 to 11 per cent there is danger that the heads will shatter or he may get caught by the late rains or snows.

(Continued on page 117)

THIS SEA OF SUNFLOWERS promises a rich harvest. A few will volunteer next year from shattered seed. A dose of the new 2, 4-D weed killer will take care of the volunteers and other weeds which might damage the grain crop.

HAD THE TRESPASSER not been a jump ahead of the bull, the owner might have had a damage suit on his hands.

IT'S THE LAW

BY RENZO DEE BOWERS

The criminal and mischievous acts of farm animals are visited on the owners. Lawyer Bowers describes the strange misdeeds of farm stock and the consequences in law.

AMELIA SANDERS lived on a farm. Her neighbor, Web Cahill, kept a flock of sheep. One fine spring day, about a dozen of Web's sheep, seized with the wanderlust, broke out of their pasture, and arrived enmasse at Miss Amelia's strawberry patch. Seizing a broom, Miss Amelia made for the garden, swinging the broom around her head and shouting, "Shoo! Shoo!"

All the sheep except the ram left the premises on the gallop. The ram stood his ground and began to nibble at the broom which Miss Amelia had thrown at him. She stooped down to retrieve her weapon, whereupon the ram stopped nibbling, lowered his head, and charged. He butted Miss Amelia once as she made an effort to escape, backed up and butted her again in midflight, knocking her down. While preparing for a third charge, the ram was driven away by a neighbor who had heard Miss Amelia's screams.

Miss Amelia sued Web Cahill for personal injuries and collected $400. Now they don't speak anymore.

In this case and in similar ones the courts have said: "If an animal injures a person lawfully trying to prevent it from trespassing the owner should be held liable, though the injury be one which the animal is not prone to commit."

Arnold Birkett and Joe Cleek maintained a line fence between their farms. and each pastured livestock on his side. One day a restive bull owned by Birkett broke through the fence into Cleek's pasture and went pawing and bellowing among the animals, looking for a victim on which to satiate a blood thirsty grouch. A pair of mules, grazing peacefully and minding their own business, were his first contacts. With a running lunge, he knocked one to the ground. Turning, he charged the other, stabbing sharp horns

deep into its side, bowling it over. With his victim on the ground, he kept goring till satisfied, and walked away, leaving the mule torn almost in two, wallowing in dirt and blood, dying. Cleek obtained a judgment for $200 against Birkett because of the vicious antics of his bull. "The gist of the lawsuit," the Illinois court remarked in the case, "is the trespass of the animal in breaking into Cleek's pasture. The damages resulting from his attack on the mules are allowed as an aggravation of the trespass."

The over-all precepts of the law, when neighbor clashes with neighbor over an attack or trespass by a farm animal in which injury is done, are simple in statement and easy to understand. The owner of an animal is liable for injuries which he suffers it to commit through his negligence; and under ordinary circumstances he is not liable for misconduct of the animal upon any other ground than that of negligence. If he has done all that he reasonably could have done to prevent injury, he will escape financial outlay for its damaging escapades. He is answerable only for failing to exercise ordinary care to keep his beast from damaging others.

These precepts may seem reassuring to one who has a recalcitrant horse, mule, bull, ram, boar, or other quadruped on his farm whose unwonted antics he has been eyeing with apprehension from time to time. They seem to indicate that all one need do to escape liability for forays by animals upon the rights or safety of others is to be reasonably careful in looking after them.

But don't be fooled by the seeming benevolence of these rules. In reality, they pack a wallop artfully concealed under gentle trappings. The owner of farm animals who would remain innocent of charges of negligence is under an absolute obligation to restrain his livestock from trespassing upon the lands of others. He is unconditionally liable as a trespasser himself for any trespass committed by his animate property. The law conclusively presumes negligence against him without regard to the facts in a particular case. Whatever damage an animal does while trespassing, whether it be destruction of property or injury of a person, is an aggravation of the trespass itself. The owner is financially liable on both counts.

That is how the law, octopus-like, insinuates its tentacles. If your Dobbin, Taurus, Isabel, or Mephistopheles barges into a neighbor's premises uninvited, that act of the animal is a trespass for which you stand responsible. If, while wrongfully there, the beast also happens to go berserk and destroy property or attack a human being, you become liable for the damages resulting from the occurrence, to be added to damages for the trespass itself. You are considered guilty of wrongdoing by proxy. The person suffering on account of your guilt can force you to pay compensation for his injury or loss. As for you, it is a vicarious atonement, and you emerge from the ordeal holding the bag. But it is an inevitable result of your ownership of the animal. You are answerable for its conduct, whether or not you knew it had evil in its make-up.

Statutes have been enacted in some states permitting the impounding of stray trespassing animals and requiring payment of damages and expenses by their owners before obtaining release of the animals. These laws, where they exist, render it optional with the proprietor of the land trespassed upon to drive off the animals or pen them and publish notice of their impounding in the manner specified in the statutes.

Variations in applications of these rules of law are numerous, to fit the differing facts in the multitudes of cases that are aired in court over depredations by farm animals, but these essential principles remain the same. They have been enforced in suits seeking to collect damages for every conceivable situation of the kind. For instance: One's bull breaks into a field to engage another's bull in combat, and they fight till the latter dies; a ram of one owner slips away from home and butts his way into trouble on neighboring premises; a bunch of hogs trail a vicious leader across the road to another farm and forage upon flocks of prized hens or turkeys; a savage boar, scenting combat in the air from the sty on the other side of the road, breaks from his enclosure and makes a beeline for the pen of his challenging foe and, gaining entrance, battles and wounds a filly so that she dies; a buck sheep, strutting across a field where he has no legal right to be, butts the proprietor who tries to drive him off, and pushes him around until serious injuries are inflicted. In cases of the kind, if there are no legally-extenuating circumstances, the animal owners are liable for the damages sustained by the victims. The rule may even be invoked where the owner of a scrub bull negligently allows it to intrude into a neighbor's herd of thoroughbred dairy cows and father a generation of mongrel calves.

Posting a farm against hunters is without effect unless a state statute exists imposing a penalty on one who trespasses notwithstanding the posting. Such statutes, as far as the law of farm animals is concerned, add practically nothing to the rights and liabilities that arise under the common law with respect to persons trespassing upon the lands of others. Even a trespasser, if he be injured through the negligence of the one trespassed upon, is

IF A DRIVER makes a wrong choice between hitting the dog or the ditch, the dog's owner may be brought into court for the damages. A squirt of ammonia from a toy water pistol cures most dogs of this bad habit.

THE SHEEP-KILLING DOG is the subject of an elaborate body of law. Penalties range from the life of the dog to a hunk of its owner's bank account. In some states owners of killed sheep are reimbursed from the dog license fund—when the fund is solvent.

not deprived of legal remedy for his injuries. If, for instance, a farmer keeps in his pasture a vicious bull, known by him to be likely to gore any person coming near him, a trespassing hunter attacked and injured by the animal may recover damages from the farmer, whether or not the land was "posted" against hunters.

Out of the vast total of gentle and tractable creatures that inhabit the country, any individual is likely at an unpredictable moment to revert to the type of his remote ancestors, suddenly become vicious, and vent his ire on the first human being or other animal that crosses his path. That a few of them do just that is evident from authoritative reports of the numerical extent of the animal population and of the multitudes of accidents and injuries attributable to keeping them.

THE MASTER of a vicious dog is responsible for his misdeeds, even on the home grounds.

Statistics of the U. S. Department of Agriculture disclose that in 1948 there were in the entire country 78,564,000 cattle, 55,038,000 hogs, 35,332,000 sheep, 6,607,000 horses, and 2,544,000 mules, aggregating 178,085,000 individuals, to say nothing of the untold millions of dogs, cats, and poultry. The Department estimated by the sampling method that accidents and personal injuries due to acts of all animals constituted 12% of the total accident-occurrence on farms in the year 1946. The National Safety Council made a similar percentage estimate, with the additional information that 2200 farm deaths that year were due to attacks by livestock.

Since legal rules require owners to control their animals, rather than saddle upon others the duty of dodging them or erecting barriers against them, juries are inclined to soak the owners with stiff fines for failure to perform this legal duty. The cards are definitely stacked against the owner of a rampaging animal when he gets into court.

Fowl Often Have "Free Range"

It should be observed that domestic fowls are considered animals, but legal rules respecting them when they trespass upon gardens, crops, or grain of others than their owners, are not uniform throughout the states. In some jurisdictions where no statutes require chickens, turkeys, or other poultry to be kept on their own premises, they are given "free range", and to avoid their depredations others must fence them out. In other jurisdictions, the common law is interpreted as giving a property owner the right to recover damages for injury from trespassing fowls, although his property may be unfenced. Even in the latter states, however, one has no right to kill or injure trespassing fowls. His remedy is to drive them away, sue their owner for damages, or obtain an injunction against him for allowing them to trespass.

Ever Hear of "Scienter"?

Excepting in states where statutes exist eliminating what the law knows as

"scienter," (such knowledge as charges a man with the consequences of his act) an animal owner cannot be held for injuries inflicted by his animal while in a place where it had a right to be, unless the animal had a vicious propensity known to its owner. The reference here is to animals that are not trespassing at the time of causing injury.

Consideration of an occurrence and its aftermath in the state of New York will point up this situation.

Merrill Hill rented his farm to Arthur Chase, agreeing to supply the horses to work the place. On one of the teams furnished was a horse twenty years old, which had always been of a peaceful and plodding disposition, and which Hill had never known to go off the beam and act up unless under severe provocation. Hill knew that the old fellow had been difficult to shoe, that he had once reared and struck at a person who was looking into his mouth, and that he had jumped and knocked the clippers from the hand of a man who was clipping him. But he had never been known to kick a person.

At the end of a certain day's work, Chase drove the team to the stable and unharnessed the horses. Upon entering the stable, the old one went into the wrong stall. Chase went in and backed him, and the horse thereupon ran out. Chase drove him back in, and he again stubbornly entered the wrong stall. Chase followed and put a hand on his hip, whereupon the ancient beast humped up in the middle and let go with both feet, kicking the man in the throat and face and inflicting injuries from which he died a few days later. Chase's administrator sued Hill for damages, but the court exonerated him on the ground that the horse was not trespassing when he kicked the man, and there had never been any mischievous conduct on his part to put his owner on notice that he had a vicious propensity to kick a person.

Many states have enacted statutes eliminating "scienter." Their effort is to make the owner liable for personal injuries and property damage, whether or not he knew his animal was vicious. They are aimed primarily at the dog menace, with special reference to sheep-killing dogs. As one court said, "Such statutes are meant to encourage the raising of sheep and to discourage the raising of dogs." Nowadays, dog owners who get sued because of their dogs attacking and killing sheep or other animals, or biting and injuring people, may as well reach for the checkbook. They seldom escape with their financial skins whole. Suing, however, is not the only remedy available to owners whose animals are attacked, or to those who are themselves set upon by a beast. They may legally kill the vicious assailant, if they can do it while the act is in progress.

Although a man in danger of injury from a rambunctious animal is justified in protecting himself by any means at his disposal, the law in some states makes him responsible for the damage to the animal. Marvin Woods, a farmer living near Laclede, Missouri, was fined $15 for damage to a neighbor's bull which chased him into his own woodshed. Woods feels the fine was worth the revenge he had on the bull, which has given him a wide berth since the incident. The bull, owned by Elmer Kling, charged Woods, who saw him coming. Fear lent wings to Woods' feet and he was a good fifteen feet in the lead as he rounded the corner of his woodshed. Ducking in, he slammed the door on the bull, which pawed and snorted outside, cheated of his victim. Looking around for a suitable weapon to drive off the beast, Woods' eye fell on a bucket of kerosene. Opening the door a crack he let fly at the bull, covering his hind quarters. Using an old broom for a torch, he applied it to the bunch of hair on the end of the bull's tail. The fifteen dollars was to cover the damage to the bull.

THE GENTLE LAMB may grow up to be an ornery ram. A farmer should know his animals.

YOU CAN SUE a neighbor when his chickens raid your garden, but you can't shoot them.

Cows on the Highway

A new menace has arisen in recent years with the arrival of automobile travel to flood the highways with vehicles, which makes less Elysian the life of an animal owner on the farm. Many motorists have little concern for animals on the road, and frequently injure or kill them. Farmers, on the other hand, sometimes carelessly let

(Continued on page 92)

How To Feed Hogs

BY JOHN H. ZELLER

SINCE what goes into a hog determines what you'll get out of him, it's common sense to put the right things into him. The day of random feeding of market hogs is gone. Feed costs are high and the farmer who makes a go of the hog business must know the best and most economical feeds for the job. He must know when and how to feed, for successful market hog raising is a matter of combining hogs and feed to get the most out of both.

The good hog farmer also keeps a well-thumbed set of records, his silent partner who can tell him at a moment's notice what it cost to produce any pound of pork that left his farm, and what that pound of pork brought on the market.

With the help of his records he can cull the grain wasters from his herd as efficiently as milk tests do for the dairyman, or trap nests do for the poultryman. If he does this he soon has a herd of hogs that makes every pound of feed count. At that point his profit starts to climb, for of every dollar he spends raising hogs from 75 to 85 cents of it goes for feed.

This means that feeding is the big key to profitable hog farming. The farmer who knows the fine points of feeding stands a good chance to make hogs pay off.

Author Jordan is a successful Midwestern producer of purebred Chester Whites. "I've worked with hogs most of my life," Jordan says, "and the longer I work with them the more I realize that feeding hogs properly is a precision job. You have to

mix feeds and balance rations as though you were a dietitian. Good hog feeding is not just throwing them a few baskets of corn and waiting for them to fatten out. It pays to know which feeds to use for each job and how to mix them to get the fastest gains at the lowest cost."

Ways to Feed

There are four primary methods of serving a hog his meals. He can be hand-fed, self-fed, fed on a limited diet, or allowed to hog down crops.

It was about 1920 that self-feeders came into style on Midwest hog farms. The idea caught on fast, for self-feeders produce rapid efficient gains and save a lot of work. The self-feeder keeps the pig in the pantry 24 hours a day. The plan works because pigs refuse to overeat. When self-fed they eat often and settle for small quantities. By eating smaller amounts with each feeding the animals assimilate more of the feed and make more efficient gains per pound of feed.

Self-feeders are often cafeterias. Different feeds are placed in separate compartments and the hog gets a chance to balance his own ration, an act which he manages quite well. By some hidden talent he selects the foods which supply him the necessary nutritional elements in the right proportions. His needs change as he adds weight, but if fed cafeteria style he will adjust his eating habits to his changing needs. Farmers who know the right proportions for feeds at various weights on their hogs can mix the complete feeds and give the animals only one choice. This eliminates the chances of an animal shorting himself because one part of the feed might at some time be distasteful.

If hogs are hand-fed the grain and protein mixtures are usually mixed and fed as slop. They can be fed dry, however, in which case the hog needs a constant supply of drinking water.

Limited feeding is sometimes used when feed is short or when hogs are on pasture and the owner can, by feeding them less grain, make them eat more grass.

Hogging down crops saves the cost of harvesting with machinery. It also gets manure back on the land without hauling it from the feed lots. Hogging down is usually a matter of fencing in corn, or other grain crops or root crops, and allowing the hogs to eat at will. In one corner of the field should be a self-feeder containing a protein supplement and mineral mixture.

Feeds for Growing and Fattening

A hog is a rapid growing animal that will, when well fed and well bred, reach a market weight of 225 pounds in five to seven months. The digestive system of a hog is much like that of a human. The stomach is small and must get its food in concentrated form rather than the bulky forages which satisfy sheep and cattle.

Hogs are getting a balanced ration when their innards are being filled with quality feeds, properly proportioned with carbohydrates, proteins, minerals and vitamins to meet their optimum requirements at different weights. Some feeds are too high in one element or too low in another. This makes it necessary to combine feeds to get the needed elements in proper proportions.

Carbohydrates supply heat and energy. They are found in abundance in corn, wheat, barley, oats, rye and grain sorghums. These feeds contain small amounts of fat and are low in protein. The proteins, which grain feeds lack, however, are vital to a hog for building and maintaining body tissue. Proteins must be supplied in other feeds. High protein feeds are of either animal or plant origin. The animal source proteins commonly used are milk products, tankage, meat meal, meat and bone scraps, and fish meals. The plant source proteins are high oil extracted feeds such as cotton seed meal, soybean meal, and peanut meal. Dried and ground, legume hay meals also supply protein. The hay meals carry, besides protein, good quantities of certain essential minerals and vitamins.

The principle minerals a hog needs to stay on the healthy side are calcium, phosphorous and salt. Hogs will usually get all their mineral and vitamin requirements without special supplements if they are on a well balanced ration of high quality protein feeds and forages. While the cereal grains are low in calcium, the high protein feeds such as skim milk, tankage and fish meal are high in the element and ordinarily furnish all the animals need. Phosphorus is usually adequate in both grain and protein supplements. Good quality pastures furnish minerals and vitamins and help bridge deficiencies of those elements in the grain ration.

Within recent years there has been considerable interest among hog men in the value of semi-solids or condensed buttermilk as a hog feed. Across the corn belt agricultural colleges and state experiment stations have conducted investigations to determine the value of semi-solid feeds. These experiments point out that hogs fed some semi-solid with their daily ration will make more rapid gains than those getting no milk products. The experiments also show that semi-solids are a rather expensive feed when considered in relation to the amount of gain they put on a hog. Express rates for condensed buttermilk are high. The product is about 60 per cent water and rates must be paid on the total weight. It sells for a price nearly as high as tankage on a ton basis, but is worth only one-third or two-thirds as much as tankage in feeding value. The semi-solid or condensed milks are especially valuable for the feeding of sows during the early stages of the suckling period, and also for stimulating growth in the young pigs.

Where hogs are fed in dry lot there is always the chance that their diet may lack some of the essential minerals and vitamins.

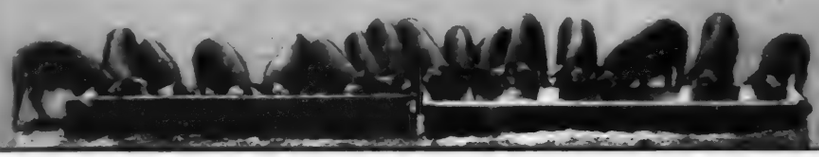
DRY LOT FEEDING OF MARKET HOGS

PERIOD	CORN	PROTEIN-MINERAL MIXTURE
First six weeks after weaning	70 parts	30 parts
Second six weeks after weaning	75 parts	25 parts
Third six weeks after weaning	83 parts	17 parts

Protein-Mineral Mixture	
Tankage	10
Fishmeal	10
Soybean meal	35
Linseed meal	20
Alfalfa meal	20
Mineral mixture*	5
	100%

Mineral Mixture*	
Iodized salt	20.0
Steamed bonemeal	20.0
Pulverized limestone	57.7
Ferrous (iron) sulphate	2.0
Copper sulphate	0.1
Manganese sulphate	0.2
	100.0

On the average, hogs at Beltsville, Md., self-fed in dry lot, have required less than 360 pounds of feed per 100 pounds gain on the above ration from weaning at 56 days of age to a weight of 225 pounds. One entire crop of pigs consumed an average of 332 pounds of feed per 100 pounds gain; another, 341 pounds; and another, 351 pounds of feed. Any wasted feed is included in these figures. For hogs on good quality legume pasture the quantity of the protein-mineral-supplement may be reduced 25 per cent.



HAND FEEDING is profitable for the farmer who knows his hogs and their needs at every age. The grain and protein supplement are usually fed as slop, but can be fed dry.

HOGGING DOWN corn and small grains is popular with man and beast. Grain is harvested without labor, and manure is spread without hauling it to the fields.

For insurance against such shortages hogs in dry lots should always have before them a mineral mixture in self-feeders. A good mixture for the job is one that contains equal parts air-slaked lime, steamed bone meal and common salt. In regions where there is an iodine deficiency, iodized salt should be used instead of common salt. If the hogs are on a mixed ration it is a good practice to add one pound of mineral mixture to each 100 pounds of feed mixture. Too much mineral mixture can do more damage than too little. Hogs can be thrown off their feed by over-doses of mineral mixtures. The old theory that if a little is good a lot is better doesn't work in swine feeding.

How Feeds Rate

Not all feeds have the same nutritive value, or the same ability to tickle a hog's taste buds and make him go back for seconds. In addition to knowing the relative costs of various feeds the farmer must know the ability of each feed to grow a pound of pork and how to mix them into a palatable feed that will keep hogs banging the feeder lids until trucked off to market.

Corn can be fed shelled or on the cob. It need not be ground. On the other hand, the small grains should all be ground for best results. Usually it doesn't pay to soak grains unless they are so hard, dry or flinty that hogs go half hungry rather than work on them.

Corn and hogs are a team. When we want to know the comparative feeding value of some other grain we compare it with corn. For convenience, corn should be considered the base or 100 per cent in determining the percentage value of other grains.

Wheat is higher in total digestible nutrients than corn. Pound for pound, good quality wheat averages five per cent more efficiency than corn in producing hogs. However, wheat produces the best results when teamed with other grains. Wheat by-products, such as middlings, may replace up to one third of the corn in the ration.

The value of barley as a hog feed depends largely on its weight per bushel. Pound for pound, heavy weight barley, 49 pounds or more per bushel, may equal 92-100 per cent that of corn. Medium weight barley, 45-48 pounds, may equal 85-90 per cent of the feeding value of corn while light weight barley, less than 45 pounds, may be worth as low as 75 per cent that of corn.

Good quality oats, 32 pounds or more to the bushel, equals corn pound for pound in feed value, providing it does not make up more than one third of the ration for growing hogs. If fed in larger amounts the proportion of fiber may decrease its value to 65 to 70 per cent that of corn.

Rye has a feeding value of about 90 per cent that of corn when it makes up no more than one half of the ration. Rice by-products have a similar value. Grain sorghums have about the same feeding value as rye but they will stand on their own merits and need not be mixed with other

grains. Molasses is worth about 90 per cent of the value of corn when it constitutes up to 20 per cent of the ration.

Other feeds, such as white potatoes, soybeans, and peanuts, are frequently put to work as hog feeds, but because of their bulk or high oil content should be mixed with other feeds for best results. White potatoes should be boiled or steamed and then replace not more than 50 per cent of the grain ration. Soybeans should not make up more than 10 per cent of the grain ration or the grower may be docked at the market for producing soft carcasses. Peanuts are relished by hogs. They should be fed to young stock up to 75 or 100 pounds in weight and then replaced with hardening feeds to produce firm carcasses.

All of these feeds need help. They should be fed in conjunction with protein and mineral supplements to balance the ration. The protein feeds are often not available on the farm and have to be purchased from outside. They are also usually higher in price than the grain feeds.

Farmers sometimes have to argue with themselves before they are willing to purchase these high priced feeds when they have a crib full of corn. Yet, each pound of high protein feed up to the required levels for the hog's weight may save as much as five pounds of grain. A serving of high protein feeds in the hog's ration also speeds up gains and helps the farmer to sell his hogs on a higher market before the general run of pork hits the stock yards.

Marshall Butterfield, who raises corn, hogs, and dairy cattle in Butler County, Ohio, says of protein supplements: "They're expensive, but they're worth it. It's fun to raise hogs when you can see they're doing something. When Dad used to raise hogs on nothing but corn it took 10 months to fatten a hog out for market. They'd just drag along and you never did have anything. Now we can get them ready in six months and raise twice as many hogs in a year."

The animal protein feeds such as tankage, meat and bone scraps, and fish meal usually have to be purchased. Skim milk, buttermilk and whey, which are often by-products of the farm, are most valuable for young pigs during the suckling period when they can supplement the sow's milk. If the supply of milk products is limited, sows with suckling litters and pigs up to 75 pounds in weight should get preference. If animal protein feeds are expensive or lacking, pigs weighing more than 75 pounds can be grown and fattened on plant protein feeds. These are usually fed as meals of soybeans, cottonseed, linseed, peanuts, and alfalfa in combinations to supplement the grain ration.

When winter pastures are short, or in dry lot feeding, home grown legume hays make valuable sources of proteins and vitamins. Good quality legume hay should be fed as a supplement to the ordinary winter ration. In tests conducted at the Beltsville, Mary-

(Continued on page 88)

THESE DIRTY FACED YOUNGSTERS fill up on green grasses and legumes, then start rooting for grubs, exercise, and minerals. Since the mixed pasture supplies much of their minerals and proteins, they will eat less of the supplement which is still offered in self-feeders. Poor pasture saves little feed, but an acre of good mixed alfalfa, clover, and blue grass can supply feed equivalent to 1000 pounds of grain and 500 pounds of protein supplement during the year.

The Two-Faced Cat

Depraved killer of birds or exterminator of rats and mice? The cat is capable of both, for she will kill a rat for dinner and a bird for dessert and expect praise for both.

MOST farmers have cats whether they like them or not. Cats have a habit of adopting the farmer or staying with the farm when it changes hands. A farm in the spring would seem to be lacking something without a mother cat prowling around the out-buildings followed by a mewing brood of sore-eyed kittens with their tails pointing to heaven.

As a rat killer the cat cannot compare with a barn owl or a black snake and certainly not with a good shot of Antu or Red Squill, but a good hunting cat that will take the offensive against a tough, fighting rat is of real value around the farm. Even a fraidy-cat has some value, for rats don't quite know the difference between Tabby the Terrible and the Fireside Puss. The mere presence of a cat has a deterrent effect.

Harlow Walker, whose four cats can be seen sunning themselves on the doorstep or haunting the milk room of his farm in Gambier, Ohio, says, "All four of the cats don't kill as many rats as a good dog, but at least they keep the rats from thumbing their noses at me. Before we had a cat I would go to the barn and find the rats lined up just for the laughs when I tried to hit them with a pitch fork."

Most any cat can lower the mouse population; it just seems to be a matter of desire on their part. One old belief was that only a stolen cat would make a good mouser. Animal psychologists who have made careful studies of cats say that the desire to kill rats and mice is instinctive with all cats. This hunting instinct is active in kittens from a month to three months of age, but if it is not developed before they reach five months they lose interest in hunting and turn to softer ways of making a living. This seems to account for the fact that cats which have led sheltered lives and never come in contact with mice or rats during their kittenhood seldom, if ever, develop into hunters.

A hunting cat will teach her young to hunt. Whether she does this knowingly, as many cat raisers believe, or merely gives the kittens a chance to develop their natural instincts, as the scientists say, the results are the same. The mother cat, who is usually a far better hunter than her mate, brings a dead or half dead mouse to her young and plays with it in their midst. The kittens are attracted to the moving object as the bedraggled mouse tries to escape or the mother cuffs it about, and join in the game. Soon they are out hunting for themselves.

In support of the statement that the mother cat is the best hunter, Dr. W. A. Young, President of the American Cat Association, says, "I recall one black and white alley cat, with a litter of kittens that had 18 mice strung out on the floor in the morning, representing her night's work in our feed room. She had a dish of meat, a bowl of milk and basin of water and had helped herself freely to this food. As near as we could tell she had not eaten any of the mice; at least there were 18 dead ones there as evidence of her ability."

The Murderers

The same cat that is killing the rats and mice that raid the grain bin will also hunt song birds that protect the crops by killing off millions of harmful insects. An estimate made some time ago by the Massachusetts Commission on Fisheries and Game is that stray cats kill around 2,000,000 birds each

year in that state alone. Edward H. Forbush, Massachusetts State Ornithologist, who quotes the above estimate in his bulletin "The Domestic Cat," states that among the birds most commonly preyed on by the cat are the robin, bluebird, catbird, quail and ruffed grouse. The economic loss to the farmer is emphasized by Forbush when he says, "Many birds, particularly the young, consume more than their weight of insect food daily, and it is not unusual for a pair of birds and their young to dispose of from 300 to 1,000 insects a day."

The cat does most of its bird hunting at night and early morning when it catches the birds on the nest and can get both the mother bird and her young. Ground nesting birds are particularly susceptible to this form of attack as is the robin whose nest is never carefully concealed. Young birds just learning to fly are easy prey for the cat and in the fall, when cool weather keeps the insects close to the ground where the birds must come to feed on them, the cat claims many victims.

Naturalists, who have followed the gruesome though methodical practice of examining the stomach contents of all of the dead cats they can lay their hands on, claim that invariably there is evidence of recently eaten birds. The feathers and other such evidence of bird killing is found in the stomachs of city cats as well as those from the country. Far less often is there any sign of recently eaten mice or rats. From this and other evidence they charge the cat with sharing man's responsibility for the decline in the bird population, particularly the ground nesting varieties.

There are ways, however, of minimizing the harm the cat does. The most effective way is to lock the cat in at night in the granary or some place where they can use their hunting abilities against the rats and mice. They should be fed in the morning before they are released. This keeps that cat away from the birds during the time the cat loves best to hunt and when the birds are most helpless.

There are those who claim that cats can be trained to ignore birds. One method is to hold the kitten and let a captive bird such as a canary peck him on the nose. The New York Zoological Society's Bulletin, July-August 1937, claims that the same results can be achieved with a stuffed bird.

Another school of trainers discourages the cat's taste for birds by giving him a bird that has been loaded with pepper or doused in kerosene. One or two such unpleasant experiences is supposed to make puss shun an indigo bunting as we would blue vitriol.

One farmer claims that he broke his cat of the bird habit completely. His cat had a preference for baby chicks. The cat's execution day was set when the farmer got the idea for a final

A CAT does not hunt because she is hungry; she hunts because it's fun. If she is too lazy to hunt, she makes a sluggish pet. The choice is between the birds and the cat.

THE TIGER STRIPES of their remote ancestors are still the most common markings of domestic cats. Naturally carnivorous, cats now relish milk and vegetables.

A LAMB'S BACK is a fine, soft place for a kitten to sink her claws. This lamb washed the kittens' faces and kept them warm on cool spring nights.

drastic lesson. He removed all of the chicks from a pen and put the cat in with the crochety, broody hen. When his trouncing was over it is reported that the cat signed the pledge and swore off birds for life.

A turn-about tale is told by Albert France whose hill-top farm in Kentucky usually harbors from eight to a dozen cats. "One year," France recalls with a chuckle, "we had a pair of mocking birds nesting here who took real pleasure in tormenting the cats. The first time I saw it done, one of them dived down from about twenty feet, pecked Smoky on the base of his tail and was up in the air again before the cat recovered enough to turn on it. The pair took turns harrassing the cats, hovering over their heads just out of reach. The cats were completely frustrated. At first they turned on the birds; then they tried to ignore them, walking toward the house with all the dignity they could muster while the birds dive-bombed them. The cats would keep up their show of dignity until they were a jump or two from the house, and then they would make a run for it. By the end of the summer they were nervous wrecks."

France, who admits to a passionate fondness for cats, believes that there is no sure way to keep them from killing birds. "If you keep them in at night it will help, but it won't stop them completely," he says. "Last summer we had a nest full of buntings in the spirea bush by the front window. The cats didn't bother the nest even though it was only four feet from the ground, but when the young were learning to fly they caught the weakest of the four."

There have been cases where cats were trained to hunt birds. In California, cats have been used to kill the linnets which were destroying the fruit crop. Stuffed cats have been tried to frighten crows but these cynical birds only laugh at such pretense.

Pussy The Pet

The value of a cat as a pet in the home is hard to assess. For some it has no value at all; it may even be a nuisance. To others the cat becomes a close friend that understands and responds to their moods and is happy to adapt itself to their way of life. The cat is not like the extroverted dog whose affections are outgoing and boisterous, who demands to be allowed to plant great wet kisses on its master, or who thinks nothing of taking a romp in carrion and then hurling himself into the best chair. The fastidiously clean cat shows her love in a purring, leg rubbing caress that seems to demand a return of affection.

Ralph Jeffries, who keeps a well fed tabby on his Ohio farm, doubts that these animals are capable of affection. "Cats," he remarks, "are selfish animals and only pretend to like you because they have a calculating eye for food and comfort. Our dog will come out with me to do the chores even in the worst weather just to be near me, but the cat you can find under the stove in the warmest spot. She wouldn't budge for anything but food. You can feed and pamper a cat for ten years, but the moment you step on her tail she will sink her claws in your leg. I guess I'm prejudiced, like my wife often tells me, but I just don't like the animal. On the other hand, I can get downright mad at people who let cats stay on their farm and don't take care of them. Those mangy half-starved cats are the ones that go wild and do all the damage."

Meat And Potatoes

In their natural state, cats live mainly on rodents, birds, bugs and fish. Since they teamed up with man, they have acquired a taste for vegetables and dairy foods. Beside their regular food, cats nibble a little grass as a tonic, and eat, smell, roll in, and generally go on a tear if they can get catnip. They also love valerian and marum but hate wild rue, which has been used as a cat repellent by fastening sprigs of it to the dove cote or tying bits of it under a hen's wings.

Some people seem to feel that the cat should be able to forage for himself and that feeding him will take away his sharpness as a hunter. This does not work out so well in practice, however, since you want the cat to kill far more mice and rats that it needs for food, and furthermore, you want your hunter in good physical condition to tangle with rats. As an old English proverb put it:

"Who will not feed the cats
Must feed the mice and rats."

Two meals a day, morning and evening, are recommended for the cat. The diet may be half vegetables and half meat. There is some disagreement among the experts on the advisability of feeding starchy foods like boiled potatoes, but cats love them and seem to thrive on them to a ripe old age. Most cats like cooked green vegetables and some like raw carrots, raw fruit, and will gnaw onion until the tears run. Cats relish the cooked cntrails and lungs of chickens and other animals and the gristly ears of sheep, pigs, and cattle. In spite of their strong hatred of water some cats will fish for themselves by scooping the fish out of the water and some will dive in after the fish. All of them like fish and clams, oysters and other shell fish. Cats love milk, cheese and butter and most farm cats know the milking schedule and are on hand to get a handout or a few squirts from the teat. Cats love to gnaw on bones and will pick one clean but they should not be fed chicken bones since these break into sharp fragments. Even though cats, unlike dogs, chew their food, they will swallow the sharp chicken bones which may pierce their intestines. The two-meal schedule should be increased for mother cats if they are to develop and nurse their kittens.

Cats are subject to a number of diseases such as distemper, worms, fits, gastritis, cat typhoid, inflamed eyes and a variety of skin diseases. They are susceptible to rabies and can transmit this disease to other animals and to man. A list of diseases of the cat and their treatment can be found in the Yearbook of Agriculture for 1942.

Facts And Fancy

People can't be sensible about cats; they have always hung superstitious beliefs on them. They have been endowed with supernatural powers to predict the future or to cause disaster. At one time it was common belief that a witch had the power to turn herself into a cat nine times. From this comes the belief that a cat has nine lives. Another belief was that when a cat was twenty years old it turned into a witch and when a witch reached a hundred she turned back into a cat.

Black cats are avoided, and it's especially bad luck to have one cross your path. Some folk believe that a three-colored cat will bring good luck. During the Middle Ages, however, black cats were supposed to have had the power to cure epilepsy and a black cat in the home insured that all the daughters of the house would find husbands.

There has been a widespread belief that cats will smother a baby by "stealing" its breath. But other lore holds that if a cat is kept in the cradle with the child it will drive away evil spirits and that passing the tail of a black cat nine times over the sore eyes of children will cure them.

The howling of a tom cat on the back fence, might be a love call to him, but the old timers believed it was a sure sign of death for a member of the household.

How Blue Is Puss' Blood?

Cats have their shows and their show points. The breeds are divided into two main groupings, short-haired and the long-haired. Within these groupings they are further divided into classes by their color and markings. As an example, there are both short-haired and long-haired tabbys, which is the name given to the most common of all cat markings, the tiger striped cat with dark bracelets on its legs, a dark necklace about its neck, and a dark line down its back that connects all of its stripes. The blacks, whites, blues and tortoise-shell colored cats also fall into both long and short-haired groups.

All of the long-haired group are believed to have been developed from eastern cats such as the Angora and Persian. The short-haired cats have come from Africa and western Europe. The similarity in markings of the two groups and the difference in size, between the long-haired cats of America and the true Persians, which are small delicate animals, would indicate that there has been a great amount of crossing between the long and short-haired groups.

There are a few imported breeds, like the Siamese with its fawn colored body, black mask, legs and tail, and blue eyes; the handsome walnut brown Burmese; and the long legged, tailless Manx that show under their national names.

Cats Love Only Cats

There are many stories of female cats mating with such oddly assorted animals as rabbits, lynx, racoons and skunk, but none of these alleged mismatings have ever been authenticated. The female comes into heat two or three times a year in the north and four times in warmer climates. There seems to be considerable variation in the heat periods since some owners of Siamese cats report that their heat periods come as often as once a month.

With her odor and her love call the female lets everyone in the neighborhood, including all of the toms, know of her desires. She will remain in heat from three days to two weeks. During this pe-

(Continued on page 111)

LIKE HIS JUNGLE ANCESTORS the cat hunts at night. In dim light he sees very well; without light he is blind as a mole, but can use his whiskers as feeling antennae. If confined to the grannery at night, the cat will hunt mice and rats rather than birds.

SAVING WOOD

For a few cents the new preservatives protect farm wood structures and fence posts from termites and decay.

WHEN WE THROW NATURE out of balance we usually pay the piper — in one way or another. Take the problem of termites; they are chewing their way through nearly 50 million dollars worth of wood in a year. Entomologists (the two dollar word coined for the men who study bugs) say that the reason we are having so much trouble with them is that we are trying to change the ordinary processes of nature. We take wood and build it into houses and barns; we expect these to be permanent structures. But nature wants it otherwise: to her a tree that is no longer living is meant to be consumed by termites or wood destroying fungi and converted into humus, which in turn becomes part of the lifeblood of growing plants. So we have the problem of combatting natural wood destroyers if we hope to make our wooden structures at all permanent.

In the states south of a line drawn from Portland, Maine, to Portland, Oregon, we have the heaviest damage by a hard-working insect that is as efficient as a buzz-saw in destroying wood—the termite, often called the white ant, or flying ant. The termite is not white nor is it even distantly related to the ant family, in fact they are deadly enemies. Actually the termite is a kind of a roach. The fact that termites are thought to be ants has complicated the problem of their control. The termite is a blind, small, soft-bodied creature of the dark. It is a worker completely subservient to its social order, a form of communism so final that the most radical Soviet citizen would in comparison seem a conservative capitalist. Its food is cellulose, in any form, a tree, an oak floorboard, or a postage stamp. Its civilization is older than man's by several million years.

Of the eighteen hundred known varieties, we have fifty-eight in this country; the most common being the *Reticulitermes,* which must retain a contact with the soil through earthen tubes to gain moisture, and the *Kalotermes* which can live without any contact with the ground. Maeterlinck, in his book, "The Life of the White Ant", (he used the popular misnomer "white ant" in his title for identification) describes it as "living in darkness, underground cruelty, the atmosphere of a penal cell and a charnal house . . . in a deliberate, heroic sacrifice to an instinct and an idea."

Less spectacular, but even more costly, in the amount of wood ruined, is decay caused by wood destroying fungi. Experts figure the bill for fungi at around $250 million dollars a year; close to the loss by fire.

If we want to tame the termites and wood destroying fungi we have to be smarter than they are. And farmers have a very special reason for being interested in the subject of wood preservation . . . for they use more wood each year than any other industry.

It's easy enough to say that every fence post should be treated with some kind of a wood preservative, but just where are you going to buy treated posts? In the South they are becoming easier to buy, but in most parts of the country the farmer will have to treat his own or do without. And how are you going to do the job on the farm? Lots of farmers are aware of the fact that the foundation timbers, sills, flooring and framing for barns, chicken houses, hog houses and other buildings should be made of treated lumber, but what lumber yard is equipped to treat small quantities of building lumber? The farmer, as usual, has to be a jack-of-all-trades and do his own treating.

So let's take a look at our old farm friend, the fence post, since it is a wood product most farms use and many produce, and see how we can go about making it last longer. The methods we use in preserving it can be applied to all kinds of farm timbers and unfinished lumber.

Wood preservatives can be divided into three types: (1) toxic oils, or mixtures of oils of low volatility, (2) chemicals that are dissolved in water and (3) poisonous materials (to insects and fungi) that are dissolved in volatile or non-volatile solvents.

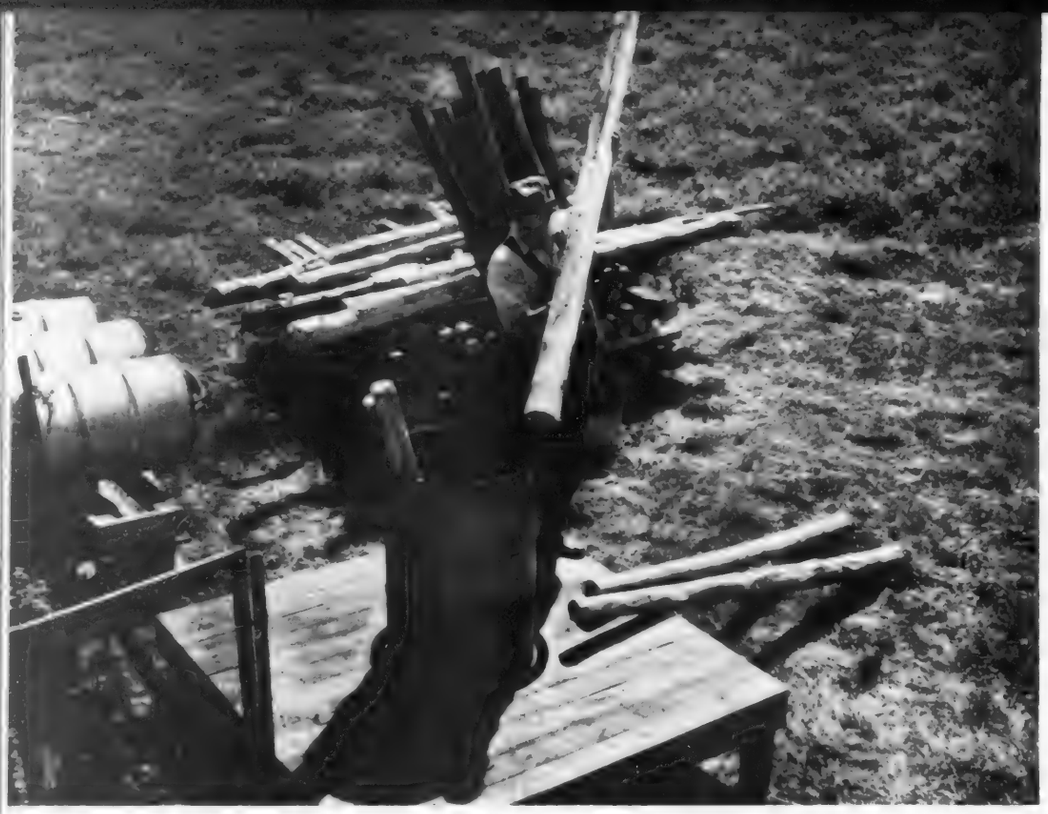
In the first type is coal-tar creosote, the grand-daddy of all wood preservatives. Developed over 100 years ago in England to keep the ships-of-the-line of the Royal Navy free from marine borers and other parasites, it was accepted so completely that seamen even used it as a hair dressing for their pigtails and were called "Jack Tars." Railroads and power companies have found the various combinations of creosote and oils to be good preservatives but they usually buy from a large commercial plant equipped to do the processing; the farmer is not. The problems involved in using creosote preservatives on the farm are: they should be applied by the hot-cold bath method; that is, the posts are first put in a creosote bath about 200°F. temperature for several hours, depending on the size and species. Then they are transferred to a cold creosote bath for a treatment. It is not easy to paint over the top of creosote-treated wood. It's black and sticky, and termites and fungi find it too messy to eat.

Of the second group, the water-dissolved chemicals, zinc chloride or zinc chloride mixed with chromium salts, are the most commonly used. It is applied to green, unseasoned posts and gives good protection from termites. However, when posts treated with it are exposed to the weather the chemical leaches out in time and allows decay to take hold.

In the third group of preservatives are such toxic tongue twisters as pentachlorophenol and copper naphthenate. These chemicals, highly poisonous to fungi and termites, are dissolved in volatile oils such as stove oil, distillate or tractor fuel.

If you can walk into your lumber yard and buy a fence post already treated with

THIS hog house looks like the sturdy work of the average hammer and saw farmer carpenter. It seems to be in good shape, too, until you take a close look at it. Termites have made sawdust out of the skids in four years. The other lumber is damaged too.



STEPS IN TREATING POSTS AND LUMBER IN PENTA

THE FARM fence post treating plant shown above was built for less than fifty dollars, by welding three oil drums together. The base was sunk in the ground; the platform makes it easier to place the seasoned posts in the drum for treating. After the tank has been loaded and the top cover chained in position, the tank is filled well over the top of the posts with the Penta solution.

THE TREATING TIME varies from 12 hours for pine to 48 hours for hardwoods. When the lid is unchained the posts are still buoyant enough to jump up. Standing the posts in a drum top to drain for a few minutes will catch the excess Penta, which can be used again. Then the posts are stacked and allowed to dry for a week or more in the direct sunlight before they are used.

a good preservative, you may have to pay $1.00 or more, but it is worth it, for its life expectancy is many times that of an untreated post.

Farm Treating Plant

To get protected posts or lumber you may have to go into the treating business with a group of neighbors. The trouble and expense you take will pay off when you go down the fence line in a year or so and give the posts the "push test"; it's mighty comforting to feel hard timber instead of the crackling of a dry, tunneled shell.

The new preservative Pentachlorophenol usually called "Penta", for obvious reasons, that is made by Dow Chemical, Midland, Mich., and the Monsanto Chemical Co., St. Louis, is the first real advance in the preservative field in many years. Tests by the Forest Products Laboratory, Madison, Wisconsin show it is giving excellent results. The Dept. of Forestry, University of Illinois, the Mississippi State College Experiment Station, State College, Mississippi, and the Idaho School of Forestry, Moscow, Idaho, have shown that it has all the wood preserving ability of creosote, plus several advantages of its own. It's easy to use, can be applied cold, and soon dries to leave the post clean and easy to handle. One method of testing preservatives used by the Forest Products Laboratory is to set about 100 untreated posts in the ground: then treat 100 posts in one preservative, 100 in another and so on. As many as 23 different kinds of preservatives have been used on test posts set during the last 10 years. The tests have been conducted at Saucier, Miss., a spot in the South which is subject to termite and fungus damage. Speaking of the results in 1947, on posts that were set in 1936 J. O. Blew, Technologist of the Forest Products Laboratory, USDA, said, "The untreated Southern yellow pine posts had an average life of 3.3 years. All 99 posts in the test which were pressure treated Pentachlorophenol, (a 5% solution) in used crank case oil, are still serviceable. Two posts show some decay."

Making Posts Last

Treating posts with Penta is certainly no more complicated a procedure than dipping sheep, and besides, a post doesn't jump. There's a definite way that you do it.

First, get the right kind of posts

Some woods are easier to treat than others. Some last longer, treated or untreated. And the "best" kind varies in different parts of the country, depending on the kinds of wood available. As a guide you can refer to the table on the right. For more definite information on the durability of your native woods see your county agent or write the State Forester.

Cutting the posts

Cut only round posts, because the outer layers of sap wood treat much easier than inner heartwood.

The usual length for a fence post is seven feet. The best way to get straight posts is to examine the standing trees from a distance. Make the cut so as to eliminate "knots," "crooks" and "swell butts" whenever possible. For line posts, a peeled diameter of 3 to 4 inches is best. For corner posts you will need a peeled diameter of five to six inches. However when treated posts are used it's possible to stay with the smaller sizes.

Peeling the posts

Whenever possible cut your posts in the spring or early summer when they peel easily. Old farmers say this is "when the sap is up." This makes peeling easier. In the South there is a period in the middle of the fall when posts are easy to peel. By doing it at this time, the hot, humid summer months, when decay sets in, can be avoided. Posts with bark on won't take preservative. Peeled posts look better too. Be sure all the inner bark is removed. A preservative solution can't penetrate properly if either the inner or outer bark is left on the posts. Trim small knots and branches flush before treating. The posts will be easier to handle in the treating tank and also in the post hole.

Use only sound, solid wood. Partially decayed trees are much weaker and their strength is not increased by treatment. They will soak up more preservative solution too. Do the peeling or shaving of the posts before seasoning them. They will dry faster and season better.

Seasoning the posts

Put the posts in a well-drained area and raise the first row off the ground with concrete blocks or stone. Space the posts with plenty of air space, at least three inches apart. Change the direction 90° on each layer of posts. That will give you a cross-hatch effect like the cover on Grandma's cherry pie. Once the posts are seasoned (it takes 3 to 6 months) they should be protected from snow, rain and dew. A good schedule is: cut in the spring, season through the summer and treat in the early fall. They won't soak up the preserving solution if they are green or wet.

Posts can be soaked either vertically or horizontally. Vertical treatment with butts down is considered best since the weight of

(Continued on page 133)

DURABILITY OF HEARTWOOD OF NATIVE TREES

Table by C. S. Walters, Dept. Forestry, Univ. of Illinois

Very Durable	Durable	Moderately Durable
Cedar, Alaskan	Catalpa	Fir, Douglas
Cedar, eastern red	Locust, honey	Larch, western
Cedar, northern white	Mulberry, red	Pine, southern yellow, dense
Cedar, Port Orford	Oak, burr	Tamarack
Cedar, southern white	Oak, post	Coffeetree
Cedar, western red	Oak, white	Elm, red
Cypress	Sassafras	Elm, rock
Redwood		Gum, red
Yew, Pacific		Hackberry
Chestnut		
Locust, black		
Osage orange		
Walnut, black		

Low Durability	Not Durable	Very Low Durability
Pine, loblolly	Fir, balsam	Aspen
Pine, northern white	Fir, southern balsam	Basswood
Pine, pitch	Fir, western balsam	Buckeye
Pine, pond	Hemlock, eastern	Cottonwood
Pine, shortleaf	Hemlock, western	Willow
Pine, slash	Pine, jack	
Pine, southern yellow	Pine, Jeffrey	
Pine, sugar	Pine, lodgepole	
Pine, western white	Pine, ponderosa	
Beech	Pine, red	
Birch	Spruce, eastern (black, red, white)	
Butternut	Spruce, Englemann	
Dogwood	Spruce, Sitka	
Elm, white	Alder, red	
Elm, cork	Ash, green	
	Ash, black	
	Ash, white	
	Cherry, black	
	Gum, black	
	Gum, tupelo	
	Hickory	
	Magnolia	
	Maple, hard	
	Maple, soft	
	Oak, red (black, pin, etc.)	
	Persimmon	
	Poplar, yellow	
	Sycamore	

When a cow falls off in milk she may have Acetonemia, a commoner disease than most dairymen believe. It's likely to strike the heaviest producers first.

ACETONEMIA

BY J. W. BAILEY

WHEN the doctors give a disease a fancy name that common folk can't pronounce or remember, we get around it by giving it one of our own, something simple and descriptive, like the "miseries." But no one has ever got around to giving Acetonemia an easy name. The disease has variously been known as Ketosis, Hypoglycemia, Acetonuria, Ketonuria and a few others in the sixty-four dollar class.

Acetonemia is not by any means a rare disease and yet its symptoms are so vague and varied, and so similar to those of other ailments, that dairymen can seldom identify them for what they are. A further complication is that it is often accompanied, or caused by, other diseases. When an animal begins to fall off in milk, gets moody and goes off to herself, or throws a wing-ding in the cow yard, the dairyman goes to the phone and calls the vet.

"Doc," he says, "one of my cows ain't acting right. Maybe she's got whatyoucallit."

Unfortunately, the veterinarian may not have the answer either, because they don't know much more about Acetonemia than they did some forty years ago.

And this is in spite of the fact that Acetonemia is today one of the commonest diseases of dairy cows! In fact, it is likely that only mastitis and Bang's disease are more prevalent and widespread. It will be noted that we say dairy cows, and there is a very good reason for this. The disease seems definitely related to high or long continued milk production. This excuses bulls, steers and beef cows from susceptibility. Bulls and steers give no milk and beef cows generally aren't in the habit of working themselves to death producing milk. Their particular job is raising calves and growing fat. Accordingly, they produce a little milk for a few weeks to get their calves well started, and then they forget about the whole business and go dry. Unfortunately, dairy cows seem to have a corner on the disease.

Fourteen cows in a fine purebred Holstein herd in New York, with many of them being milked three times a day on Advanced Registry test, recently came down with Acetonemia. The ailing cows went off their feed and of course production lagged.

The requirements of heavy milk production were being met here with a vengeance, as several of the big old cows had been producing over eighty pounds of milk daily before they sickened. This was a rather unusual wholesale visitation of Acetonemia, but in the last twenty years we have seen affected animals of practically all dairy breeds in all sections of the United States. The disease is no respector of breed or quality. In fact, it is the highest producing cows that are the most susceptible.

In spite of its prevalence many dairymen will dispute the statement that Acetonemia is one of the commonest diseases of dairy cows. A few years ago one of the leading dairy breed journals conducted a round table discussion on Acetonemia by correspondence with the managers of some of the largest dairy farms in the United States. Only about one half of them regarded Acetonemia as a common or dangerous disease.

A large number of excellent cow men said that Acetonemia had never appeared in their herds. Veterinarians generally think that no large herd of heavy producing cows has ever been entirely free from frequent cases of Acetonemia.

It certainly is easy enough to mistake Acetonemia for some of the old standby disturbances like indigestion, milk fever, hardware trouble and others. This is because of the wide difference in symptoms and conditions under which the disease may appear.

Acetonemia may affect milk cows of all ages and breeds at all times of the year. Allen Hetts, who operates a dairy near Detroit, Mich., says, "If one breed of dairy cows can ever be definitely proven to be the best, that breed may be expected to be more susceptible to Acetonemia because it will be a high-producing breed. Until then all breeds will probably be about the same in regard to being affected with the disease."

It has been reported from all sections of the country and under all conditions, regardless of whether the animals are pastured or stabled. As a further aid in confusing the issue, it may appear months before calving, months afterward, or at any time in between.

It may appear in any one of at least three different forms. The most common one is probably the so-called "digestive" type, which shows symptoms like simple indigestion or "hardware trouble" due to nails, wire, and indigestible objects in the stomach. An affected animal "goes off-feed," acts depressed, and frequently develops an anti-social temperament, separating herself from the rest of the herd. Constipation is a pretty general symptom, which may mislead the owner into believing that the animal is merely "bound up," and prompt the use of epsom salts or other laxatives. The temperature, heart rate, and frequency of breathing generally remain close to normal, even in very sick animals. This is a confusing angle and partly the reason why Acetonemia is often unsuspected as a cause of trouble in the cow barn.

The digestive type is seldom fatal, but there's loss in decreased milk production. Untreated animals are apt to go along at quarter speed for several weeks or even months before recovering. Sometimes milk production stops entirely, and is not resumed until the cow has freshened again.

Then there is the "milk fever" type, which shows the same general symptoms as milk fever. As a matter of fact, cows frequently have both Acetonemia and milk fever at the same time. In addition to the symptoms as given above, a new one is added. The poor beast gets shaky and uncertain on her feet, and grows progressively weaker in her hind quarters. The time finally comes when standing is no longer possible and the animal goes down. Once down she is apt to draw her head around to her side in the typical position of milk fever. However, she may stretch out flat on her side and go into a death-like stupor. Treatment is required for this type, and should be given immediately if not sooner. Otherwise the owner puts in a call to the nearest rendering works.

A third kind of Acetonemia is the "nervous" type. Symptoms run the gamut. An affected animal may bellow like a bull and attack people, or go blind and stagger aimlessly around the premises. She may tremble and slobber and grind her teeth, walk backwards or in circles, or try to climb straight up a barn wall. There are other possible symptoms, too. However, you may as well use your imagination, for any astounding action you can think of may well be a symptom of nervous Acetonemia. Frightened owners have frequently shot such animals because they believed them to be "mad." Here, too, immediate treatment is necessary to save the animal from the fertilizer factory.

With all these different varieties and varying symptoms contributing to the general confusion, it is easy to see how Acetonemia may be lost in the shuffle, and other diseases blamed for dairy cow troubles. As has been pointed out, the digestive type looks like indigestion or hardware trouble. Also to be considered as possibilities are disturbances like mastitis, poisoning, infection of the womb, and various kinds of contagious diseases. The milk fever type may be confused with the disease it was named after, as well as with particularly serious cases of the various troubles listed under the digestive type. The nervous variety of Acetonemia can easily be mixed up with brain tumors, abscesses of the spinal cord, Listerellosis, Rabies, and other forms of brain diseases.

Putting the finger on Acetonemia is commonly done through the use of the so-called "Ross" test, adapted for field use by the late Dr. C. E. Hayden of the veterinary college at Cornell University. One gram of a mixture composed of one part sodium nitroprusside to 100 parts of

AN UNCOMPLICATED CASE of Acetonemia responds to an intravenous sugar solution injection almost at once. This partly paralyzed cow has the milk fever type of the disease.

BEEF COWS are thought to be entirely immune to Acetonemia, which is associated with high production and the accompanying drain on the body sugar supplies. Milk production is only a brief incident in a beef cow's life; it's the dairy cow's whole life.

ammonium sulfate is dissolved in 5 cc. of urine or milk. Then a small flake of sodium hydroxide is added, the mixture is shaken vigorously and set away.

When mixed with the chemicals, milk or urine indicate Acetonemia by turning to some shade of purple. The severity of an attack determines the darkness of color and also the length of time that it takes for a color change to appear. Consequently, such a change may appear almost at once, or it may take several minutes to show up. To be on the safe side, it is advisable to wait for at least ten minutes before deciding that no color change is going to appear.

Other diseases might be present and these fellow-travelers are not revealed by the color change. Acetonemia may appear with milk fever and other troubles such as indigestion, hardware trouble, pneumonia, and infection of the womb. All have been known to be associated at times with a positive test for Acetonemia. For an understanding of how this can happen, a brief look at the cause of Acetonemia is needed.

We have been on rather safe ground in describing the symptoms and diagnosis of Acetonemia. As for the cause of the disease however, we leave the comfortable path of certainty and enter the region of conjecture and theorizing. There are a number of theories, but we will give only the one most generally accepted without making any claims for its being the correct one. At best it's only a very good guess.

Popular belief has it that the old milk wagon gets into trouble with Acetonemia because the production of milk takes large amounts of sugar from the blood. Sugar is needed for many body processes, including the digestion of fats. In the last stages of the digestion of fats it has been reduced to the so-called "ketone bodies," of which acetone is one. Sugar is then used to break these products down into carbon dioxide and water so they can be thrown out as body wastes. If the sugar supply is low or lacking entirely, the ketone bodies pile up in the blood and poison the animal.

Even after the blood sugar has reached a low level, the producing cow continues to remove about the same amount of it from her body every day, causing a progressive increase in the amount of ketone bodies retained in the system. When sugar supplies are gone entirely, milk production necessarily has to stop until adjustments have been made. This sounds plausible, but it isn't as simple as that; otherwise all high producing cows would have Acetonemia. This, of course, is not true. In certain cases something goes wrong somewhere, probably in the liver, where a product called "glycogen" is stored for quick conversion into sugar when it is needed by the body. This gives us our clue as to why factors other than high production may cause Acetonemia.

We learned in the eighth grade that the liver is a sort of filter for all the blood in the body. Since infections all may eventually get into the blood stream, what more natural, then, that infection at any place in the body might be carried to the liver? If the infection is severe enough the liver gets out of whack. When that happens it cannot supply the sugar for the destruction of ketone bodies and should Acetonemia follow, it has to be considered as a secondary disease caused by an impaired liver.

(Continued on page 114)

FARM BOOKS

(Continued from page 20)

Farm Mechanics, by Cook, Scranton & McColly; The Interstate, Danville, Ill. $3.15.

As farming becomes more mechanized, the farmer finds increasing need for engineering skills. He must be a machinist, carpenter, blacksmith, and maintenance man. A new farm book, *Farm Mechanics,* by Cook, Scranton, and McColly, is a practical book of instruction in the maintenance and repair of farm equipment, the construction and up-keep of farm buildings, and the diverse shop work that is done on the farm. In its 744 pages of text and illustrations it tells how to do such jobs as sharpen a mower, mortise a joint, mix barn paint, or clean and replace an oil filter in a tractor. There is even a section on the care and repairing of harness, seldom used nowadays, but there just in case.

The book was written as a text for agricultural students and, though it is easy to read, it does have a class room flavor. An example of this school teacherish writing is in the introductory sentences on glazing, "Glazing is an important subject since windows of farm buildings frequently become broken and should be repaired. Broken windows admit much cold and hinder proper ventilation." In spite of its style this book will have an every-day use on the farm. Although it takes up scores of subjects, it covers each completely and in fair detail, and uses enough illustrations to *show* how a job should be done.

The three men who compiled this book are all teachers with wide practical experience. They have done a good job of reducing many complex subjects to understandable form.

Farming for Profit, by H. R. Herndon; Thomas, Springfield, Ill. $3.75.

Farming for Profit was published in 1947 and has made some friends for itself among people just starting out to farm. H. R. Herndon, the author, learned farming late in life, but in the usual way, by mistakes, by searching through text books and government bulletins, and by talking to neighbors who started their agricultural education the day they were born. The 211 page book which has resulted from this research and experience is a primer for new farmers. The author hits a multitude of high spots, but does not have space to delve very deeply into any subject.

The old timer will find little here he doesn't know, but if a person, sincere in his desire to learn this new field, wants to read up on it, *Farming For Profit* is a fair enough place to begin.

The Farm Book Store

The Editors of the Farm Quarterly, after a careful selection of current agricultural books, recommend the following to our readers.

Soil and Crops

Soils and Fertilizers—*by Firman E. Bear*.....$3.75
An understandable book on the complex subject of fertility.

Farmers of 40 Centuries—*by F. H. King*.....$5.00
A review of this book may be found in the Farm Books Column.

Using and Managing Soils—*by A. F. Gustafson*.....$2.80
Fertility, rotation, drainage, erosion, tillage are covered.

Elements of Soil Conservation—*by H. H. Bennett*.....$3.20
A discussion of erosion and exhaustion of soils, by an authority.

Production of Field Crops—*by Hutcheson, Wolfe & Kipps*.....$4.50
A new edition makes this the latest work on American field crops.

Vegetable Crops—*by Homer C. Thompson*.....$6.00
The science of producing and handling vegetable crops.

Weeds—*by W. C. Muenscher*.....$6.00
The identification and control of these soil bandits.

Herbs, Their Culture and Uses—*by Rosetta Clarkson*.....$3.50
A standard reference on growing, marketing and using herbs.

Farm Management

Modern Farm Management—*by Andrew Boss & G. A. Pond*..$5.00
The principles and application of management to the farm.

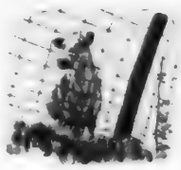
Farming for Profit—*by H. R. Herndon*.....$3.75
A review of this book may be found in the Farm Books Column.

Success on the Small Farm—*by Haydn S. Pearson*.....$2.50
Subject—how to net $3,000 a year on 10 to 12 acres.

The Farmer's Handbook—*by John M. White*.....$4.95
Easy reference book on crops, livestock, and farm problems.

Farm Mechanics—*by Cook, Scranton & McColly*.....$3.15
A review of this book may be found in the Farm Books Column.

Malabar Farm—*by Louis Bromfield*.....$3.75
Bromfield sums up the farm practices he has found best.



Livestock

Feeds and Feeding (21st ed.)—*by F. B. Morrison*.....$7.00
The authoritative book on livestock and poultry feeding.

Dairy Science—*by W. E. Petersen*.....$5.00
680 pages of the best modern dairying practices.

Sheep Science—*by W. G. Kammlade*.....$5.00
The breeds, care and feeding of sheep for wool and mutton production.

Beef Cattle—*by Roscoe R. Snapp*.....$5.00
A carefully revised edition of this excellent book on beef production.

Poultry Handbook—*by Rudolph Seiden*.....$6.00
An alphabetical reference book of poultry information.

Successful Poultry Management—*by M. A. Jull*.....$3.50
A practical book on poultry from brooding to marketing.

Pork Production—*by William W. Smith*.....$4.25
The standard text on the breeding, raising and marketing of hogs.

Swine Enterprises—*by Arthur L. Anderson*.....$2.80
A thorough study of swine raising for the beginner.

The ABC's of Beekeeping—*by A. I. Root*.....$3.75
The standard reference book on bees and honey production.

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HOW TO FEED HOGS

(Continued from page 75)

land, experiment farms, legume hay meals made up 5, 10, 15 and 20 per cent of the ration for pigs weighing from 65 to 225 pounds. The result was rapid, economical gains. The five and ten per cent levels were most efficient since each pound of hay saved a greater amount of corn, tankage, and linseed meal than it did when it made up 15 to 20 per cent of the ration. When protein supplements are high in price, however, it is still profitable to make the ration 15 and 20 per cent hay.

During the second World War the production of alcohol for war purposes left a variety of by-products of dried distillers grains with solubles from different grains and grain mixtures. The distillers by-products were tested at Beltsville, to determine their value in building hogs. When fed at 9 to 12 per cent of the ration, they produced gains varying from 1.17 to 1.26 pounds daily and the amount of feed needed to produce 100 pounds of pork varied from 392 to 425 pounds. When the same products were fed at 18 to 26 per cent of the ration they proved too costly. The gains were slowed up by 30 per cent and 40 per cent more feed was required to produce 100 pounds of pork.

The farmer who does a scientific job of feeding his hogs knows to the pound how much crude protein they need at any one time in their lives. Guess work is not profitable over a period of years. By knowing the protein content of every feed he mixes in the ration he can determine the percentage of protein in the total ration. The following chart tells the protein needs of a hog at various stages in its life.

Class of hogs	Dry-lot % Crude Protein	On Pasture % Crude Protein
Bred Sows	15	13
Bred gilts	13	11
Sows suckling litters	15	13
Weanling pigs	19	18
Growing pigs, up to 125 pounds	16	14
Fattening pigs, 125 to 250 pounds	14	12

Pastures for Hogs

Grass is nature's contribution to healthy livestock. Properly rotated green pastures are more than feed; they are the basis of a good sanitation program. Because a hog doesn't come equipped to handle bulky feeds he cannot be fattened economically on grass alone. When fed a limited concentrate ration, however, pastures save as much as a fourth of the grain ration and one half of the protein supplement ordinarily fed to hogs. Pastures supply needed protein, mineral and vitamins. As the hog grows it will eat increasingly large amounts of forage, thus cutting down its needs for protein supplements.

Of all the pastures, the legumes, such as ladino, alfalfa, the clovers, and rape usually yield the greatest returns in pork

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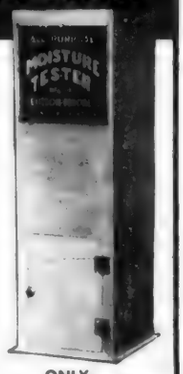

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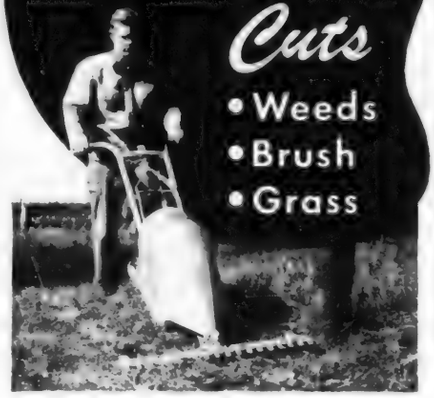

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production. Mixed grass pastures, however, provide abundant forage of good quality at nearly all seasons of the year. When other pastures are dormant or growing slowly, temporary pastures of rye, wheat, barley, oats, Sudan grass, soybeans and cow peas can fill the gaps.

Among the farmers who believe in the importance of feeding hogs on pasture is Abner Francis, a Midwestern hog farmer who sends about 150 head to market yearly. "What you can grow in the pasture field," he summarized, "you don't have to buy at the feed store. One reason we try to raise as many of our pigs as possible in the summer is because you don't lay out as much cash gettin' them to market as you do fattening fall pigs."

In the South, soil and climate make it possible for farmers to produce a variety of pasture crops which can be hogged off almost the year round. Where pastures can be spread over several months, breeding schedules can be arranged to provide a more even flow of hogs to market.

Feeding the Sow

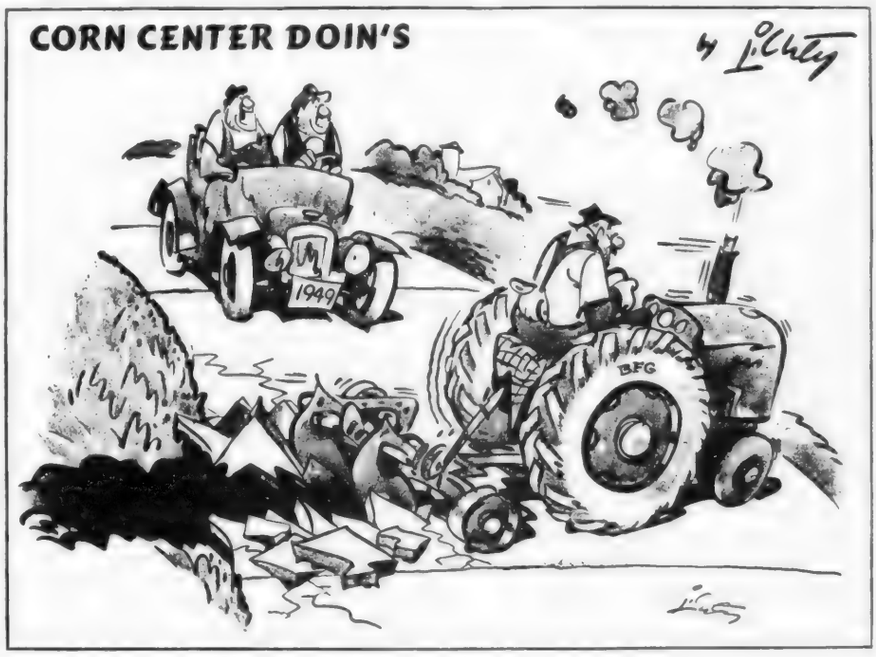
Feeding the brood sows is important on a producing hog farm, for the farmer is at the same time feeding his next crop of pigs. The manner in which the sows are managed will help determine the health of their litters.

Pregnant sows should be fed a balanced ration including minerals. They should gain from one half to one and a fourth pounds daily from breeding to farrowing time, depending on their condition when bred. Sows that are too fat often have troubles in the farrowing pen. Sows should be hand-fed, and on the herdsman falls the responsibility of regulating the amount of feed in accordance with the sow's condition.

A bred gilt should get a two per cent ration and a sow a one to one and a half per cent ration. A two per cent ration means two pounds of feed daily for every 100 pounds of live weight. Thus, a 300 pound gilt would get six pounds of feed daily. A 400 pound sow on a one and quarter per cent ration would get five pounds of feed daily. There is a good sound reason for the difference. The gilt is still growing and needs feed for her body development as well as for the growth of the litter she is carrying.

Sows should be forced to exercise so they will drop strong healthy pigs. In addition to their well balanced ration they should get good quality legume hay in winter and pasture in summer. Tests in Wisconsin showed that sows receiving 15 per cent good alfalfa hay farrowed strong litters. Those getting only five per cent alfalfa in a ration made up of corn and soybean meal failed to suckle their litters well.

It is possible to self-feed pregnant sows providing there is enough bulk in the ration to prevent the sows from becoming too fat. An adequate ration for self feeding can be mixed largely with home grown



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grains and good legume hay, with skim milk furnishing the protein supplement. Tankage or fishmeal can replace the skim milk where it is not available. Feeding pregnant sows and gilts properly pays because the bigger the pig at birth the better are his chances of reaching an early market.

After a sow has farrowed, her diet should be gradually increased until she is on full feed within a week or 10 days. This is a danger period when faulty milk supply causes many pigs to die of starvation. Sows and litters on good quality pastures should be fed a liberal ration containing feeds rich in protein and minerals. Tests at Beltsville showed that sows self-fed during the suckling period required less feed per 100 pounds gain than did hand-fed sows. The hand-fed sows were in better condition at weaning time, however, and their pigs were heavier at weaning.

For the first two or three weeks of its life the little pig is a parasite on its mother. Then it begins to strike out for itself and investigate the contents of the feeder. At this age they should have access to a separate self-feeder in a creep which is out of bounds for the sow. An excellent feed for small pigs is rolled oats, cracked corn and skim milk. Once they have started to add weight they should be kept gaining right up to the gates of the stock yard.

Boar pigs should be castrated during suckling if they're destined for market. All pigs should be immunized against cholera. A two week interval should lapse between the two operations on the boars.

In any business there is a point where it is no longer wise to invest additional money in raw materials. The hog business is no exception. The farmer who stays in the business knows when he must stop emptying feed sacks into his hogs and send them to the butcher block. Generally speaking, the larger the hog the more feed he must eat to put on a pound of pork. The saturation point is reached when it takes so much feed that it's no longer profitable to feed the hog at present prices of pork. This is usually when the hog weighs from 200 to 250 pounds.

This angle of the hog business has also been investigated at Beltsville. A test was run to determine the amount of feed required for each 50 pounds of gain from the time hogs weigh 75 to 375 pounds. The hogs were self-fed. The results are tabulated in the following chart.

Pounds live weight of hogs	Number of hogs on test	Average daily gain in pounds	Pounds of feed per 50 pounds live weight gain
75-124	42	1.62	167
125-174	42	1.75	190
175-224	34	1.71	206
225-274	26	1.65	223
275-324	18	1.46	252
325-374	9	1.31	276

A glance at this chart will leave little doubt that 275 pounds is about the top weight at which this type hog can be profitably fed under normal conditions. As the

3 of America's most useful farm Vehicles

We had farm and ranch needs in mind when we designed these Willys-Overland vehicles. We made them useful . . . practical . . . economical to operate and maintain. We gave them high clearance . . . short turning radius . . . sensible fenders . . . good road vision. See them today, at the Willys-Overland dealer near you.

'Jeep' Station Wagon

We believe the 'Jeep' Station Wagon is the most useful car ever made for a rural family. It is a smooth-riding, good-looking passenger car with ample room for 6 adults in its all-steel body, together with large parcel space. It is practical for hauling jobs, too, for seats can be removed to provide 98 cubic feet of load space. Seats and floor are washable. It's easy handling, level-riding on country roads—and, with the 'Jeep' Engine and overdrive, a money-saver on gas. See this dual-purpose car now.

'Jeep' Trucks

Willys-Overland builds two lines of pick-up and platform-stake trucks that give long, dependable service and low costs:

The 2-wheel-drive 'Jeep' Truck (4700-5300 lbs. GVW) is designed to keep operating and upkeep expense at rock-bottom for service under normal conditions.

The 4-wheel-drive 'Jeep' Truck (5300 lbs. GVW) is a rugged tonner with the extra traction you need for off-road hauling, for tough grades, for getting through snow, sand and mud.

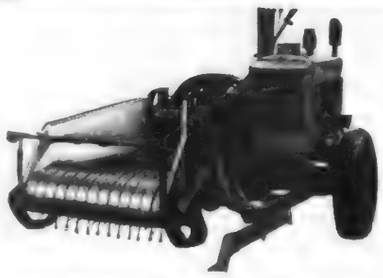
UNIVERSAL 'Jeep'

The 4-wheel-drive Universal 'Jeep' is a modern tractor that operates both pull-type and hydraulic-lift implements—plows, harrows, discs, weed sprayers, power mowers, etc. But, with a speed range from 2 mph in the field to highway speeds, the 'Jeep' also serves the year 'round as a general-purpose vehicle for hauling, towing and cross-country travel. Your Willys-Overland dealer will gladly demonstrate this handiest of farm vehicles.

YOUR SCRAP IRON is needed to make steel for implements, vehicles and other things you need. Sell it to a scrap dealer now.

WILLYS-OVERLAND MOTORS, TOLEDO • MAKERS OF AMERICA'S MOST USEFUL VEHICLES

Put Up Corn or Hay
The Easiest Way with a
PAPEC
FORAGE HARVESTER



Imagine putting up corn or hay without ever touching a hand or fork to it. You do just that when you own a Papec 151D Forage Harvester. It takes all the heavy work out of storing forage crops.

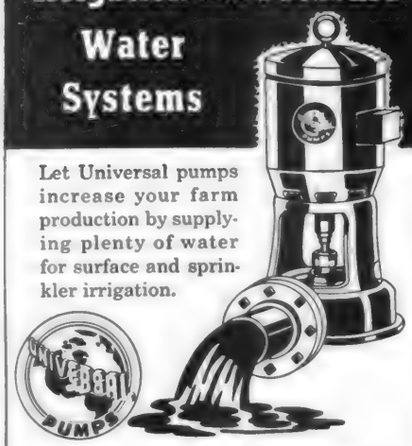
The Papec 151D handles hay—either green or cured—direct from the windrow. Corn and row crops never touch the ground. Three men can handle the whole operation from field to barn or silo. Change-over from hay to row crops can be made easily in an hour by a couple of men.

Send your name on the margin of this ad for complete information on this easiest, best way to handle all forage crops. Papec Machine Co., Shortsville, N. Y.

PAPEC

FORAGE HARVESTERS — HAY CHOPPER-SILO FILLERS
ENSILAGE CUTTERS — HAMMER MILLS — HAY HARVESTERS
CROP BLOWERS — FEED MIXERS

IT'S UNIVERSAL for Irrigation and Pressure Water Systems



Let Universal pumps increase your farm production by supplying plenty of water for surface and sprinkler irrigation.

Universal builds a complete line of injector and centrifugal type pumps and water systems to meet all pumping requirements for home, farm and industry including Gasoline Engines, Belt Driven and Selective Stage pumps.

Inquire Today!

UNIVERSAL MFG. CO., Dept. QS
1440 San Pablo Avenue, Berkeley 2, Calif.
Please send illustrated literature on Universal Pumps and the name of my nearest Universal Dealer.

Name _____

RFD _____ *City* _____ *State* _____

hog continued to add weight he required more and more feed to put on a pound of pork. To get the most from your feeds it is best to market hogs when they weigh from 200 to 225 pounds on the hoof. The consumer is also in favor of this policy for pork marketed at these weights is usually good quality meat.

The hog farmers who make the biggest returns are the ones who mix their feeds with a set of scales, a knowledge of scientific facts and a smattering of common sense.

THE AUTHOR

JOHN H. ZELLER has been studying the intricacies of the pig for the past 32 years. He joined the staff of the USDA Bureau of Animal Industry Research Center at Beltsville, Maryland in 1917, and has been there ever since, except for a few years during the war when he worked in Naval Intelligence. Mr. Zeller holds degrees from Pennsylvania State College and George Washington University. Much of his time is spent in laboratories and on experimental farms. When he visits swine experiment stations across the country he moves so fast that correspondence catches him only on his return. We learned this when we attempted to contact him for a few biographical facts.

IT'S THE LAW

(Continued from page 71)

their livestock stray upon highways and allow them to become hazards to automobiles and their drivers, with death and wreckage in the offing. Financial liabilities are involved on both sides.

It is the legal duty of farmers to see to it that their horses, mules, sheep, cattle, hogs, and other creatures inclined to wander shall not stray into roads by escaping through insufficient fences or otherwise, and that their dogs shall not catapult themselves into highways to chase and snap at passing cars. It is negligence to permit them to imperil travel: and if an autoist, while using due care, collides with one, with the result of injury or death of himself or of others riding with him, or damage to his car, the owner of the animal will be liable for the loss. It's a different story in Georgia and many other Southern states where the "open range" law still exists. Many a Florida-bound tourist has wrecked his car and then awakened in the hospital to find a bill staring him in the face for the "purebred" razorback hog that caused his accident.

Motorists have a corresponding obligation and responsibility. They cannot with impunity plunge into a flock or herd, or ram against individual animals on the road, recklessly and wantonly, and inflict death or injury, without rendering themselves responsible to the owner for damages. The negligence which will impale them may consist of reckless driving, or driving at excessive speed, or with defective brakes, lights, or other parts of their vehicles. It may consist of inattention and inexcusable failure to see danger ahead. It may be just plain dawdling at the wheel. But whatever their lapse from due care may be, they must answer to the farmer for whatever damage their negligence causes.

A Small Loophole

In the array of rules regulating liability for injuries inflicted by farm animals,

THE HERB GROWER'S COMPLETE PACKAGE

Contains useful information about each one of 12 different herbs:

1. Where to buy seeds or plants; a comprehensive list.
2. How to plan and cultivate a small patch for home use.
3. Samples of seeds, as well as dried herbs for cooking, of five popular herbs.
4. A discussion of the uses of herbs in cooking, in industry, and in medicine, giving particular details about the effectiveness and reasons for their use.
5. Detailed, complete instructions telling how to make the following herb products in small quantities: fragrant sachets, pot-pourris, (rose jar), hair rinse, herb vinegars, herb salts and seasonings.
6. Bibliography of pamphlets, books and bulletins offering a wide range of reference sources.
7. My own tested recipes for herbs in cooking.
8. Romantic and historical data on each one of 12 herbs.

This information is assembled from no other single source and has never been offered before. It is the end result of ten years' library research, plus the active, practical growing of each one of these herbs, and my own experience in making each of the products mentioned. All information has been checked by various experts in each field as a safeguard of sincerity and accuracy.

Price $3.00. Money back 100% if returned in 10 days.

Also offered are two of my items which are on sale in fine stores and have been used by people of good taste in every walk of life. EVERLASTING FRAGRANCE JAR . . . $5.00, postpaid, luxury tax included. A fragrance jar to pass down to your grandchildren. Contains oil of lavender, rose, spices, lemon verbena, rose leaves and herb leaves. Housed in a lovely rose jar.

SACHET . . . "a breath of Country Fragrance" . . . $1.00 each, postpaid, including luxury tax. Banishes musty odors in cupboards, drawers, traveling cases. Made of fragrant herbs and perfume oils. Odor gone? Rub vigorously. It will be magically revived.

FRAGRANT HERB FARM
3744 Section Road — Silverton, Ohio

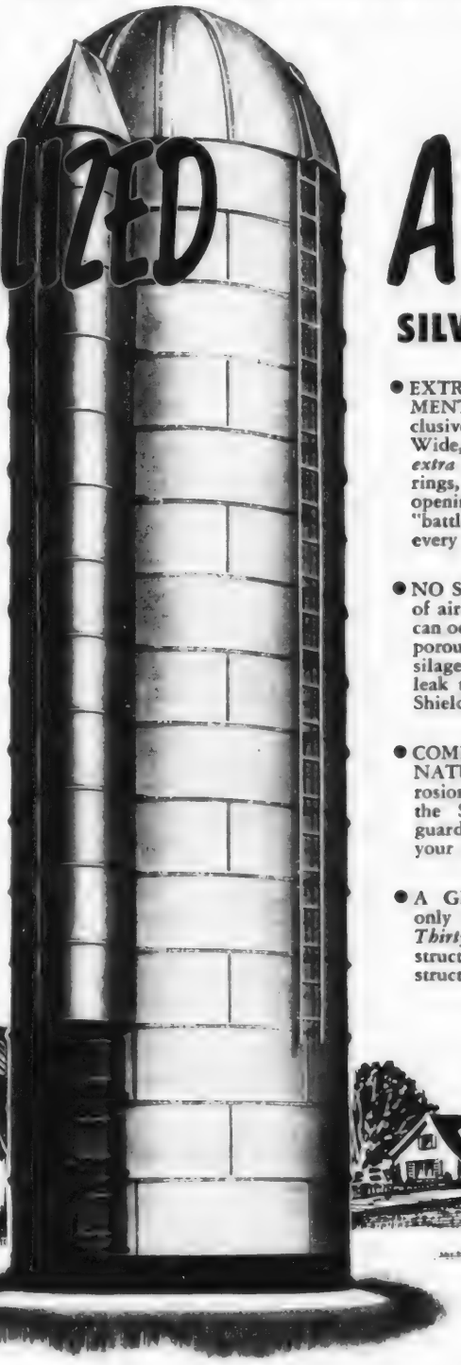
Safe-Guard

YOUR YEAR'S BIG SILAGE-FEEDING PROFIT

in the

FUNCTIONALIZED ARMOR

of a C&L Advance-Design SILVER SHIELD SILO



- GALVANIZED STEEL CONSTRUCTION provides the ONLY answer to ALL the functional requirements of the modern efficient silo — and ONLY Steel takes functional advantage of the cylindrical silo shape to *increase* its own structural rigidity!
- NO OTHER SILO on the market is so simplified and easy to erect as the Silver Shield. No specially trained or skilled labor is required. Every-day farm workmen can do a perfect job by following the step-by-step instructions furnished.
- LARGER DOORS AND CHUTE in every Silver Shield Silo make it easier to operate — easier to climb, easier to get in and out of, easier to unload. And this functional efficiency pays off in appreciation on the "pitching end"!
- EASE OF ADDING RINGS at a later date, to increase your feeding capacity, is one more great Silver Shield advantage. In every respect, the Silver Shield prefabricated steel design *anticipates* every functional silo need — and *fulfils* them perfectly!

- EXTRA STRENGTH REINFORCEMENT is a built-in part of the exclusive Silver Shield advanced design. Wide, angle-flange external joints, *extra* heavy gauges of steel in the lower rings, complete reinforcement of door openings and vertical joints, give "battleship ruggedness" to withstand every possible strain.
- NO SIDE-WALL SPOILAGE LOSSES, of air-ruined, dried-out or moldy silage can occur inside the Silver Shield's non-porous steel wall protection. Nutritious silage juices can't become air-soured, or leak through or be absorbed by Silver Shield walls!
- COMPLETE PROTECTION AGAINST NATURAL HAZARDS — Rot, Corrosion, Fire, Wind, Lightning — makes the Silver Shield Silo a loss-proof guardian for the *cost* and *profit* of your silage program.
- A GREAT LIFE EXPECTANCY is only natural for a Silver Shield Silo. *Thirty-year oldsters* still serve indestructibly — safe from corrosive or structural attack from inside or out!

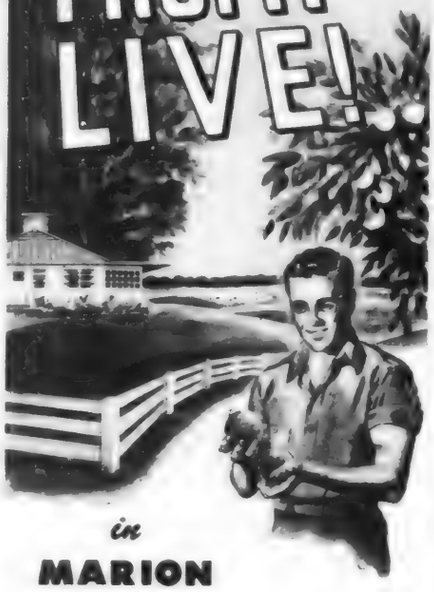
ALL STEEL C&L SILVER SHIELD SILO

NEW — the Silver Shield BABY Silo — 7'8" dia., for small-herd convenience. Write today for complete descriptive literature on silos, Corn Cribs, Grain Bins — Favorites over 30 years.

CLAYTON & LAMBERT MFG. CO.

1792 DIXIE HIGHWAY • LOUISVILLE 10, KY.

FARM-PROFIT-LIVE!



in

MARION COUNTY

Ideal cattle country!

High rolling land underlain with limestone and phosphate, plentifully supplied with water, makes Marion County the home of many famous purebred beef herds. Some of the finest pasturage in the nation still available!

Good for other crops, too!

Citrus groves, truck farms, dairying and poultry farming all return good profits in Marion County. Taxes are reasonable — and you enjoy the benefits of a $5000 homestead exemption!

Above all — life in the sun!

Here among friendly people you can enjoy wonderful hunting and fishing. Silver Springs, Rainbow Springs and many other famous springs are located in Marion County. Come to Marion County, investigate the future it holds for you.

For complete information, write to

F. Q. Goforth
Marion County Chamber of Commerce
Ocala, Florida

Please send me information on profitable farm opportunities in Marion County.

Name.....

Address.....

City.....

Zone.....State.....

there are a few loopholes through which a farm owner may escape when hauled into court for damages caused by a trespassing animal. The one most frequently availed of is to prove contributory negligence on the part of the victim.

One example from among myriads must suffice to demonstrate the rule.

Philip Skeen pastured a herd of cattle, among them several sleek cows and frisky heifers. A division fence separated his pasture from that of Argus Crane who also ran a herd, including as its moving spirit a curly-headed bull of beefy proportions, named Peter. The separating fence was of sturdy build. Peter, the bull, however, had a disdain for it when romantically inclined, and he would easily hurdle it as if in contempt, and be on about his business. His owner knew about Peter's idiosyncrasies, but on occasions when the big fellow would go on larks, Argus Crane would bide his time and in time Peter would come wandering home.

Philip Skeen also knew about the bull's propensities. He knew that while in the company of bright-eyed females, the shaggy fellow could be an ugly customer. Skeen was afraid of him. He had said so several times. But he was surfeited with the bull's forays into his herd.

One day Skeen saw Peter lift himself over the fence. Armed with a pitchfork, he made for the intruder, determined to prod him back into his own bailiwick. Intuitively aware of the advantage of attack over defense, the bull stood his ground till the man was near, and then charged. The interlude was brief—and one-sided. Skeen went down at the first rush. Before he could scramble up, he was pried from the ground by a pair of thunder-strong horns that tossed him like a feather. He hit the ground with a thud. The bull backed away and squared off for a decisive stroke to be given on the run. But at the precarious instant, Skeen's aggressive dog sprang to the heels of the snorting Peter and planted a couple of disconcerting nips, distracting attention, and enabling the embattled Skeen to shuffle his battered body to the friendly fence and scale it with unusual agility.

Skeen then sued his neighbor, Crane. But the fortunes of the law were against him. He got nothing. The court ruled that he was guilty of contributory negligence in braving the bull under the circumstances, having full knowledge of the bull's vicious nature, and that he would likely attack any human being who threatened to interfere with his amorous plans.

*Miss Amelia's experience—by permission of The Rural New-Yorker.

THE AUTHOR

RENZO DEE BOWERS, a native Missourian, spent his early life on a farm in Oklahoma, and was graduated from Oklahoma A. & M. College at Stillwater. Later he studied law and is a member of bars of Oklahoma, New Mexico, Kentucky, Indiana, Maryland, and U. S. Supreme Court. He is listed as an author in Who's Who in America. He served as Editor in the law department of Bobbs-Merrill Company, of Indianapolis, for a time and is the author or editor of some dozens published volumes of law treatises. Some of his most entertaining articles deal with the quirks of law. Part of the material in this article first appeared in the Rural New Yorker. His home is in Hagerstown, Maryland.

WEED and FEED

IN JUST ONE EASY, TIME SAVING OPERATION

Apply **Scotts** WEED & FEED with a spreader or broadcast by hand and in just a short time your lawn will be free of dandelions, plantain, etc., and the grass will be healthier, greener. For new lawn beauty try WEED & FEED this year. If there isn't a **Scotts** Dealer in your community write . . .

O M Scott & SONS CO
64 Spring St., Marysville, Ohio
also Palo Alto, California

Scotts LAWN CARE PRODUCTS

VOGEL
PATENTED

FROST-PROOF HYDRANT

- Will never freeze when properly installed.
- Running water available all year 'round.
- Reduces fire hazard.
- Increases operating efficiency.
- Over a million Vogel Frost-Proof Closets and Hydrants have been sold.

The handle in this position shows you that the water is positively shut off. A leaking hydrant is sure to freeze in winter.

★

VOGEL NUMBER 10
SEAT-ACTION CLOSET
(Not-Frost-Proof)
For Schools, Farms and Factories

These dependable closets guarantee low water consumption. They are simple in construction—there are few moving parts, and no mechanism in the tank to get out of order. Only best quality materials used.

For information, see your nearest Plumbing Supply House—or if you write us direct, state the county in which you are located.

JOSEPH A. VOGEL CO. WILMINGTON 99 DELAWARE

YOU CAN DEPEND ON THE FOX to finish the job ★

. . . and remember

with the **FOX**

you can mow, chop and load, in one operation, over 200 tons of grass silage a day

you can cut corn of any height, chop and load it into wagons, all in one operation.

One man, with the FOX, can pick up, chop and load, ready for the mow or stack, 2 tons of dry hay in 12 minutes.

● Here is the machine you have been waiting for! A machine you can depend on to finish the job without annoying delays due to repeated failures in the field.

When you own a Fox Forage Master, you own the leader in the field. The Fox is backed by 14 years of field-proven, trouble-free performance.

Look at the construction of the Fox! Strength in its essential parts! Capacity enough for the largest windrow or heaviest row crop! Safety such as only the Fox cutting principle can provide! That's why you can depend on the Fox to finish the job.

Take the Fox out into the field! Watch how the windrowed hay goes into the machine in an unbroken ribbon and comes out in a steady stream. Notice how easily it rolls. This is the machine you have been waiting for!

The Fox Crop Blower is a worthy partner to the Fox Forage Master. It stands head and shoulders above every other crop blower on the market. For a real job of forage harvesting or hay chopping, insist on complete FOX equipment.

Write today for the full story of the Fox Forage Master.

R. G. Krueger, Secretary

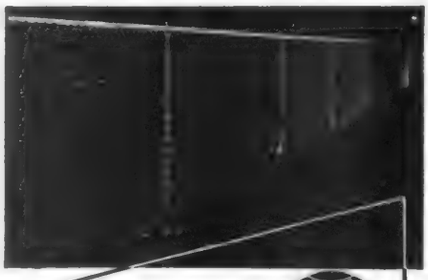
FOX RIVER TRACTOR COMPANY

Pioneers of Modern Forage Harvesting

. . . . N. RANKIN STREET

APPLETON **FOX** WISCONSIN

REMEMBER . . . When you pick Fox, you pick a Leader! . . .



It's Smart ATLAS
TO FENCE WITH

Either barbed wire armed at top, or plain. Atlas Fence resists trespass and keeps your own within. Proof against climbing or destruction, it serves night and day, year after year. Years longer lasting—electrolytic application of protective rust-proof coating puts the heavy steel core exactly in the center of every wire. Advisory service available from offices in principal cities. Skilled erecting crews install all our fences. Catalog upon request.

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PUT NATURE TO WORK RIGHT FROM THE START

M-E ROTARY TILLAGE MULCHES VEGETATION INTO SEED BED...

4 or 6 sets on each Patented Tine Unit

RECONDITIONS SOIL . . .
INCREASES CROP YIELDS

Use it spring, summer, and fall to rebuild soil Nature's way by cutting and mulching vegetation throughout tilled depth. This aerates soil, leaves it humus, improves moisture and mineral content, requires less commercial fertilizer. You'll have bigger and better yields on every crop, every year. And M-E Rotary Tillers have extra mechanical advantages: 4-cycle engines on all garden models . . . no tine breakage . . . precision-built. Ask your dealer for free demonstration or write today.

Model G-26
•
Power Take-Off Models Also Available
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Patents Pending

Milwaukee Equipment Mfg. Co.
Dept. FQ1. South Milwaukee, Wis.
Please send me illustrated folder, prices, and name of nearest M-E Rotary Tiller dealer.
Name.....
Address.....

M-E ROTARY TILLERS
MILWAUKEE EQUIP. MFG. CO.
So. Milwaukee, Wis. U.S.A.

NOTE TO DEALERS Valuable territories open on nationally-acclaimed M-E Rotary Tillers. Write, wire or phone today.

© 1949 Milwaukee Equipment Manufacturing Co.

HERBS

(Continued from page 47)

The seeder is set for small seeds, 15 to 20 to the foot, sowed in shallow drills in rows two feet apart. Seed should be covered with about one-half inch of soil. Germination takes from 10 to 15 days.

Seed may be obtained from a number of sources; a list is supplied on page 107.

The greatest single problem is weed control, and possibly in the near future non-toxic chemicals may be employed. As soon as the plants are up high enough to be identified, they should be hoed and thinned out. The sage and basil should stand about 10 inches apart, the marjoram and thyme, six inches. Two and possibly three hoeings will be needed, depending on the weather.

It is not desirable to irrigate these plants, because, if they are forced, the growth is too lush and there is too much shrinkage in drying. With lush growth there is also less oil and less fragrance or flavor. Very few insects or diseases attack these crops.

Two and a half to three months is required to bring basil and marjoram to bloom and the first crop should be cut just before the blossoms open. Care should be taken to leave enough leafage on the plant so second growth is not stunted. Two or three cuttings may be made in a season, depending on the length of frost-free weather, since both basil and marjoram are very tender.

If plants are to be sold on the stem, they may be bunched and tied as they are cut. For the last cutting, pull these annuals up by the roots and cut off close.

Starting With A Roadside Stand

If you have a roadside stand, you can introduce a few bunches of herbs, for salad; four or five sprigs each of fresh basil, thyme, marjoram, savory and dill, fastened with twine or a rubber band. These may be sold from 15 cents to 25 cents. They should be kept in water from the time they are bunched, and wrapped in waxed paper when sold.

A bouquet of small flowers like pinks, anthemis, pansies, small rosebuds with branches of basil, marjoram and lavender or mint make a welcome gift for someone who is sick, as everybody gets a lift from the tangy fragrance. Pointing this out to a nearby florist shop can develop business for you.

After growing a kitchen garden for a few years, I planted a plot of about a quarter acre and sold freshly bunched herbs and potted herb plants at 10, 15 cents and a quarter. It added up to $200 that season. My advertising consisted of a yard square sign next to the mailbox. One of the daily papers in the closest city gave me a nice story with a picture when I gave the woman's page editor some sample herbs. The next year, to give an idea of what can be done by the farmer's wife, or the farmer himself if he is so in-

SHORT CUT TO
BETTER BORDEAUX

NICHOLS
TRIANGLE BRAND
TRADE MARK REG U S PAT OFF
INSTANT
COPPER SULPHATE
99%+ PURE!

➤ **SAVES LABOR** . . . Mixes easily in spray tank. Eliminates stock solution, minimizes handling!

➤ **SAVES TIME** . . . Dissolves rapidly. No waiting for it to go into solution!

➤ **SAVES MONEY** . . . Dissolves *thoroughly*—no waste or sediment. Gives accurate control and greater safety in your mixtures—thus giving *better protection* and *increased* yields.

● **FREE!** Send postcard *today* for valuable free booklet—"Bordeaux Mixture—Its Efficient Preparation and Use."

YOUR DEALER can also supply Triangle Brand Copper Sulphate in: LARGE CRYSTALS, SMALL CRYSTALS, GRANULATED and SUPERFINE for regular Bordeaux Mixtures; also Monohydrated for Copper-Lime dusts. *The oldest and best known brand! Standard for over 50 years.*

MADE BY
PHELPS DODGE REFINING CORPORATION
Electrolytic Refiners of Copper
40 WALL STREET • NEW YORK 5, N.Y.
230 N. MICHIGAN AVENUE • CHICAGO 1, ILL.

SAVING UDDERS SAVES MONEY

Use the Original
TAMM UDDER SUPPORT
on Fresh and Spring Cows

The Tamm Udder Support transfers the weight of the udder to the cow's back, thereby practically eliminating udder breakdown. By relieving the load on the udder tissues and keeping the udder warm, the blood circulates freely during the springing and early milking period thus reducing caking and congestion which causes a considerable loss of flesh during this critical period. Ideal for giving hot baths, helps check mastitis and other udder ailments in early stages. It eliminates the possibility of injury to the udder or teats which usually occurs at freshening, and it affords cheap insurance against injuries, chill, etc. when shipping cows.

Made of 3 inch canvas webbing, adjustable at four points. Easily removed for milking. Will last for years. Used by leading dairymen across the country.

Ask your dealer if he has it; if not, order direct. Dealers write for price list.

Order by size. Small for cows 1000 lbs. or less, medium for 1000 to 1400 lbs., large for over 1400 lbs. $15.00 Prepaid—U. S. A.

FRANKSVILLE SPECIALITY CO.
FRANKSVILLE, WISCONSIN

"WHO HAS SEEN THE WIND?

Neither you nor I,
But when the trees bow down their heads,
The wind is passing by—".

No one has seen the wind, yet we know that it blows. More than that, we depend on it to perform important services for us.

Similarly, in SuperSol, there is a vital growth factor which has not been identified in the chemistry laboratory, but whose presence has been definitely proved by the results of livestock feeding experiments.

This vital growth factor, plus the known high-protein values, high-vitamin content, and essential minerals in SuperSol make it the preferred complete supplement for your livestock.

Our
FREE BOOKLET
will tell you what
SUPERSOL
will do for your
livestock — at a cost
of only 2½c
per head per day!

Write

FEED DIVISION
BROWN-FORMAN
DISTILLERS CORPORATION
at
LOUISVILLE IN KENTUCKY

PROVIDES

true VITAMIN A
VITAMIN D
B-GROUP VITAMINS
RIBOFLAVIN, THIAMIN
NIACIN, CHOLINE, PYRI-
DOXINE, PANTOTHENIC ACID,
p-AMINOBENZOIC ACID
BIOTIN, FOLIC ACID
FATS and PROTEINS
CALCIUM, PHOSPHOROUS
and ESSENTIAL TRACE MINERALS

plus **VITAL PRODUCTIVE FACTORS**

GEHL
SINCE 1859
PRONOUNCE IT "GALE"

Now
IS THE TIME TO
see and compare Forage Harvesters

Be sure you see the Gehl . . . a pioneer Forage Harvester, *time* and *field tested*. Thousands in use. Just the kind of a machine you'd expect from experienced Gehl engineering.

That famous Gehl cutting mechanism doesn't shred the fodder, it REALLY CUTS . . . *clean* and fine, as it should be. Makes silage the way you want it. With row-crop attachment, it cuts standing corn . . . tall, short, straight or tangled; chops and blows it into trailer-wagon or truck. Pickup attachment works fine on windrowed hay or combined straw. Separate blower elevates the forage to silo or any part of mow.

The Gehl Forage Harvester has its own engine and is easily handled by ONE MAN and a light tractor. Available, too, with power take-off. ASK YOUR NEIGHBOR who owns one. The many outstanding feature of the Gehl Forage Harvester are explained in a FREE BOOKLET, mailed on request with name of dealer.

With Pickup for Hay
With Row Crop Attachment for Corn, etc.
"Gehl Sales are Blowing a Gale"
Our production is up, but still we can't keep up with the demand. The Gehl Forage Harvester is winning MORE and MORE farmer customers every day. Order early to be sure you get a Gehl.
GEHL BROS. MFG. CO.
There's nothing better than a Gehl

Spray Your Barns and Livestock with

PARAGON PORTABLE POWER SPRAYER

"CONTENTED COWS give most milk!" Get rid of flies and pests that make them nervous. Paragon 20 gallon Portable Power Sprayer passes through openings only 26 inches wide. Pneumatic tires stand securely on uneven surfaces. Automatic agitators prevent solution from settling or clogging. Gas engine (or electric motor) delivers 1½ gallons spray per minute. Maximum stream 30-40 feet high. Tank has rounded ends; bottom slopes to drain cock for easy cleaning. Equally serviceable indoors and for outside work. Shipped complete with 25 ft. hose, extension pipes and nozzles, ready for use and fully guaranteed. Order from your dealer or write direct.

THE
CAMPBELL-HAUSFELD CO.
21 STATE AVE. HARRISON, OHIO

clined, I designed a little package of 5 herbs and a small 40 page cook book. I sold this locally, and then fortunately got a department store chain interested. They improved the package (mine was homemade) and ordered in quantities. I could not supply from our home, so I sold my business (which consisted chiefly of a formula for a fragrant herb sachet, and a nice looking package of 5 cooking herbs with a small cook book) on a royalty basis. The first year this newly bought business, contracting for its herbs on the open market and advertising by direct mail to gift shops and delicatessen stores, grossed $80,000; eight times what our dairy farm of 100 acres had ever grossed.

The next year I made some herb vinegars and sachets from fragrant herbs such as lemon verbena, lavender and rose geranium.

The sachets proved popular, and also were easier on the noses of our family than vinegar making. I sold the sachets through 22 Woman's Exchanges throughout the country and also through department stores. At $1 retail, 40% off to the trade, I sold 30,000 over a five year period.

Familiarity Breeds Success

Any grower will gradually learn the uses of the herbs by close familiarity; watching them progress from young shoots to seed pods and noting the varying strength in fragrance and taste. By combining what you learn in this way with a state of mind that is continually "thinking herbs," you can develop a specialty.

Mittie Arnold and Margaret Thomas of Greene Herb Gardens, Greene, Rhode Island, developed a line of packaged products from a small beginning. From three and a half acres of field herbs they now produce 3000 pounds of dried herbs. One-fourth of this is sold directly-by-mail (30 cents for two ounces), another fourth to food dealers, and the balance to nationally advertised herb packers. Miss Arnold started with herbs in 1939, buying a horehound plant at the spring flower show at Providence.

Patricia Winter of House of Herbs, Inc., Salisbury, Connecticut, started the same way. Through creating herb blends for use in fish dishes, poultry, salads, with easy-to-follow directions, she had made herbs easier to use. Through glamour packaging, and diligent national advertising, she has developed a large business, growing 15 acres herself and buying the rest on contract. Twelve people are employed on the farm during the growing season, with four additional assisting during the harvesting.

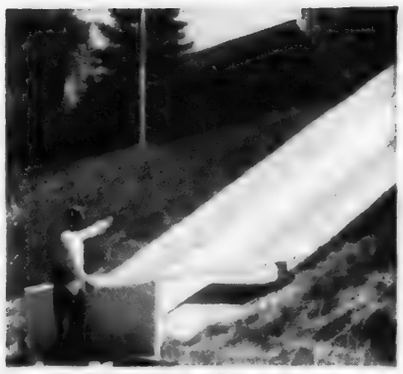
Sherman and Vera Hardy, 80 Hill Street, Lexington, Massachusetts, who grow herbs in their spare time, have four acres on which they specialize in horehound for the manufacture of 5000 pounds of horehound candy annually. They also sell herb plants out of the field and suggest plans for herb gardens.

Like so many other herb growers, the

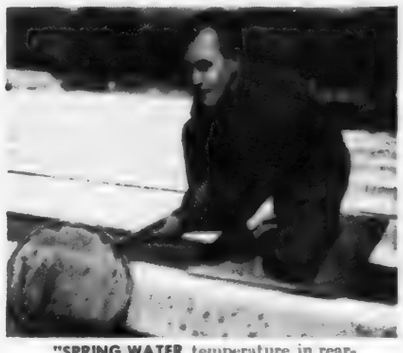
HORACE FRANTZ'S *Smart idea!*

It brought him a pot of gold at the end of rainbows... millions of 'em!

COLORADO RAINBOW TROUT are the stock-in-trade of Ford Truck user Horace Frantz who has raised and sold trout for eating and stream-stocking purposes since 1919. He farms as many as 2,000,000 trout at Colorado Springs and Salida. Sales for '48 exceeded 300,000 lbs.



TO KEEP TROUT healthy, water must be kept charged with fresh oxygen. Frantz cascades it down steps, sprays it from overhead, to keep it fresh.



"SPRING WATER temperature in rearing runways never goes below 50 or above 52 degrees," Horace Frantz (above) says. Hatching period is 4 to 6 weeks; "harvest" in 1½ years.

HORACE FRANTZ'S *Smart move!*

He uses Ford Bonus Built Trucks to do the hauling in his business!

NEW MODEL F-5 FORD TRUCK with platform body is used in a demonstration test at feeding time by Ford Dealer, Bob Allphin. Says Frantz, "My old Ford feed truck has 175,000 miles on it, but I'll bet the new F-5 could beat that." "That's a smart bet, Horace," replies Bob. "Ford Trucks are Bonus Built to take almost anything these mountain roads can give them. Every one of over 139 models is built extra strong to last longer."

"DON'T LOOK now," says Ford Dealer Bob Allphin, "but under this cab is something no other truck has! Ford exclusive Level Action suspension insulates against frame weave, smooths out the ride, prolongs cab life."

"ONE OF THE BIG THINGS about Ford Truck engines is their reliability," says Frantz. "That's mighty important to me, too, because in transporting live trout, a few minutes delay might mean loss of the entire load."

HORACE FRANTZ'S *Smart bet!*

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Fosters started out in 1941 with a small plot. They sold plants, dried herbs, and vinegars, but finding that specializing is vital in this field they soon switched to growing plants for the seed supply, which the war in Europe had cut off.

Today their list of 70 varieties of herb seeds includes some like Dwarf Purple Bush Basil and Woad, which would be commercially unobtainable otherwise.

With the purchase of seeds came so many requests for information that "The Herb Grower Magazine," a monthly magazine edited by Bunny and Phil Foster, began publication to supply some of the answers on the use and cultivation of herbs. The address is Falls Village, Conn.

The cottage gardener, after becoming familiar with herbs would do well to build up a specialty. Merchandising herbs has many limits. It can never be what business men call a "a big thing" because the market is too small. But for industrious, creative home growers, it is an excellent means of taking up the talent and energy that so many people have, especially farm wives, and rewarding them with a supplemental income.

The Market Gardener

Carl Heckel came to grow herbs the way some men become corn and hog farmers—his father grew them before him. The Heckels in Norwood Park, Illinois, grow five varieties, supplying the trade for 27 years with sweet marjoram, thyme, sage, summer savory and wormwood.

Carl, his brother Howard, and his brother-in-law, Lester Bissette, run an eight acre truck farm, working it in their spare time.

They get a good yield off their eight acres, part of which grows plum and garden tomatoes, acorn squash, pie pumpkins, and sweet corn for market, and carrots, beets, lettuce, peppers and cabbage for their own use. An acre and a half is in herbs.

By word of mouth it has gotten around over the years that you can get good healthy plants out at Heckels. This, too, is where you can go for "wormit", "bohenkraut", and "mayoram".

The "wormit" is wormwood, of which they keep a few plants to accommodate their Polish and Bohemian customers. "Plouin," as the Bohemians call it, is used for "tonic" tea, or soaked in whisky as a remedy for stomach ache. Wormwood is a principal ingredient of the wicked French "Absinthe" and being a narcotic, the manufacture of it was outlawed a generation ago in France.

Today the tops and leaves are used for home remedies by people who brought over some of its uses from the Old Country and by those in rural communities whose remedies originated with the Indians. Occasionally it is used externally for sprains and bruises, and it is an ingredient of "Absorbine, Jr."

The herb plants the Heckels grow all take about the same culture. Although they are all perennial, except summer savory, they are grown from seed each year. "By planting it from seed like this, we are able to keep the weeds out," reports Carl, busily pulling up a marjoram plant and shaking the dirt off its roots. "We have trouble with morning glories and they are liable to choke out a plant no matter how hardy it is.

"Now with thyme," he pointed over to the dark green, small-leaved, shrub-like plants at the end of the plot, "weeds, or no weeds, we'd plow it under each fall. We've already cut about 350 bunches off it, and may just plow the rest under. There's not much call for it."

On this bright October morning, a biting wind blew in from Lake Michigan about seven miles away, chilling the fingers of the five men busily harvesting sweet marjoram. The summer savory was already drying in the barn, and what was left of the sage, thyme and wormwood still in the field could stand the frost.

"Marjoram can't stand the cold like the others," Carl explained. "As soon as frost hits it the top leaves and flower heads fall off as it dries."

He bunched six or eight plants, and holding them in his left hand, placed the roots on a piece of heavy wood used as a chopping block, cutting off the roots neatly with a heavy knife. He tied the bunch deftly with an eight-inch piece of twine, and tossed it into a bushel basket.

The herbs are planted in rows about two feet apart, and 350

feet to 400 feet long. There are two rows of savory, four of sage, eight of thyme and 100 of marjoram. Seed is planted as early in spring as the ground starts to warm up and dry out, so they won't rot. The seeder is set for small seeds and no thinning out is done.

"Planted thickly we stand a better chance of keeping the weeds down," Carl explains. "In the case of marjoram, if it grows too large the leaves flop over and layer themselves. This adds to the dirt on the plant, which we don't want."

After the plants have come up about an inch, so the crop is sure, about half a ton of Chilean nitrate to the acre is drilled in under the surface of the ground, so less of it is lost with exposure to weather and air. The nitrate is used for green top development.

Cultivation depends on the amount of rain and weeds, averaging about three times a season with a scrub-type wheel hoe. They use a solid knife attachment between the rows. For the first cultivation the knives are set close together, but as the plants develop, the knives are set further apart, so the roots aren't cut.

Since these crops must be kept absolutely weed-free, at least twice and sometimes once more, they are weeded on hands and knees. For this purpose an efficient small hand weeder about 12 inches long is used. It has a triangularly shaped blade about 2½ inches long on each side, and is used as soon as the plants are ½ inch high. One man can do about 12 rows of hand-and-knee weeding a day. When using the wheel hoe between the rows, a half acre can be done in about half a day —it is just a matter of a slow walk up and down each row.

The earliest cutting the Heckels take off the herbs is around the end of September. They find their customers don't want to buy any until fall, and at that time it is maximum for size. When it is picked late in the season, there isn't as much moisture in the leaf, and there is a better chance of its drying without mold. The Heckel's figure 1800 to 2000 heavy bunches of herbs off an acre from one late cutting. Herbs don't get strong from heavy, long growth. Only basil will develop a more peppery taste.

In the loft of the drying barn, after coming up the narrow, steep, open stairs, you see hundreds of bunches of herbs, a sight reminiscent of the drying attic of our grandmothers', but on a vastly larger scale. You sniff the hay-like aromatic air. Dried herbs hang from the rafters, on nails on the walls, and bunches are stacked in crates in a corner, while the overflow is stored downstairs.

The Heckels have an ingenious device for facilitating handling the bunches. Slanting in from the floor are 2x4's about four feet apart, reaching some six feet high up on the sides of the barn. These are strung with rows of twine about 20 inches apart. About half of these are al-

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31-A
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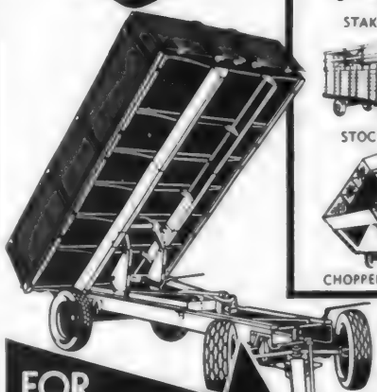

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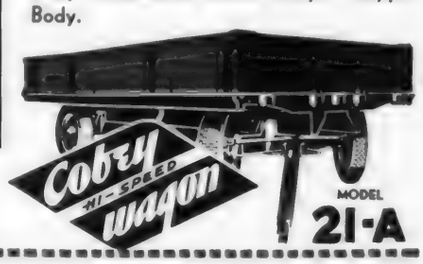

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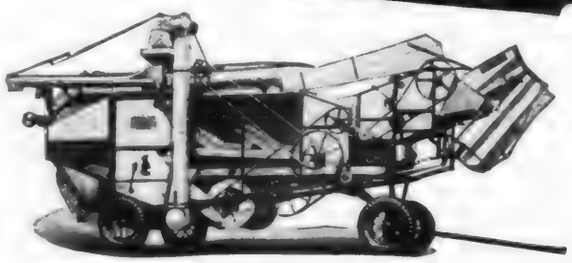

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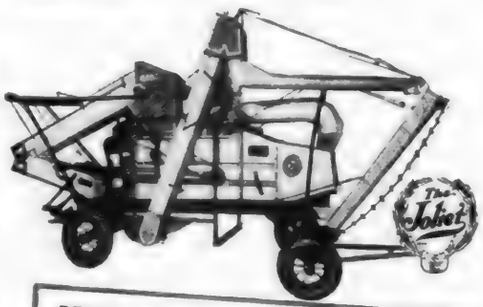

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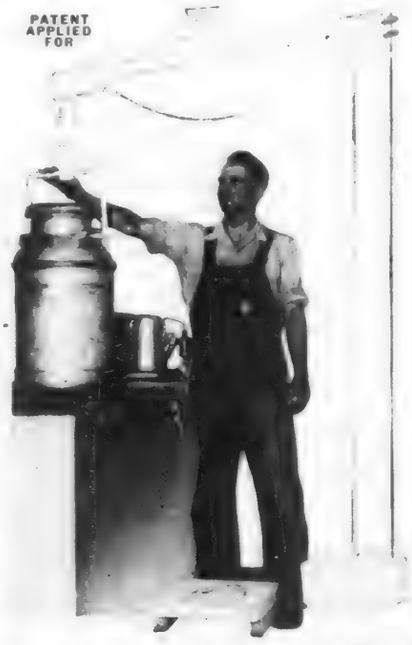

The Ottawa Safety Lock Milk Can Hoist is the safe, easy way to lift milk cans in and out of your milk cooler. Easy to install—easy to use—takes up no space. Just fasten the hoist to a beam or rafter over your cooler and it's ready to use. Place the Can't-slip handle gripper over the handles of the can and then lift can easily with one hand to proper height. Swing hoist to proper position over cooler and lower can into water. It is impossible for the counterbalance weight to be lowered or dropped accidentally. This is a protection feature for you and your cooler found only in the Ottawa Safety Lock Hoist. Anyone, even a child, can operate the Ottawa hoist easily and with complete safety. You can't afford to lift heavy milk cans in and out of your cooler when the Ottawa Safety Lock Hoist is so inexpensive, safe, and dependable. Order yours today.

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ready filled, and the rest are ready to receive the bunches carried in baskets from the field. You don't very often see an arrangement like this, because today herbs are often dried on screens, or, with modern drying equipment employing forced air.

The loft is warm and gets a good circulation of air, which the herbs need to dry properly. There is no direct light on them as the windows are high up. It takes from 10 to 30 days to dry the bunches.

A fruit and vegetable retailer came up the steps to buy some herbs. He wanted sage and summer savory. The bunch of savory he picked up was as pretty a bunch as you'd ever want to see, the plants having grown about 26 inches high, which is maximum. The leaves were a good green, while the flower heads dried to a deep red. There were between 15 to 18 plants to a bunch. Heckel sells all his herbs for 12 cents a bunch, to retail at from 17 cents to 25 cents, depending on the location of the retail store.

The retailer picked out what he wanted, then began to complain about the price. Carl shook his head impatiently. "If they knew the work that went into production, they wouldn't chisel on price. No use in growing this stuff if you're just working for your health," he said.

Parsley Is Queen

There is a greater acreage in curly parsley, than in any other herb crop. It is grown throughout the country, but in especially extensive acreages through the Southwest. But the Harry Schauls are an example of the small growers who have an acre or less of it.

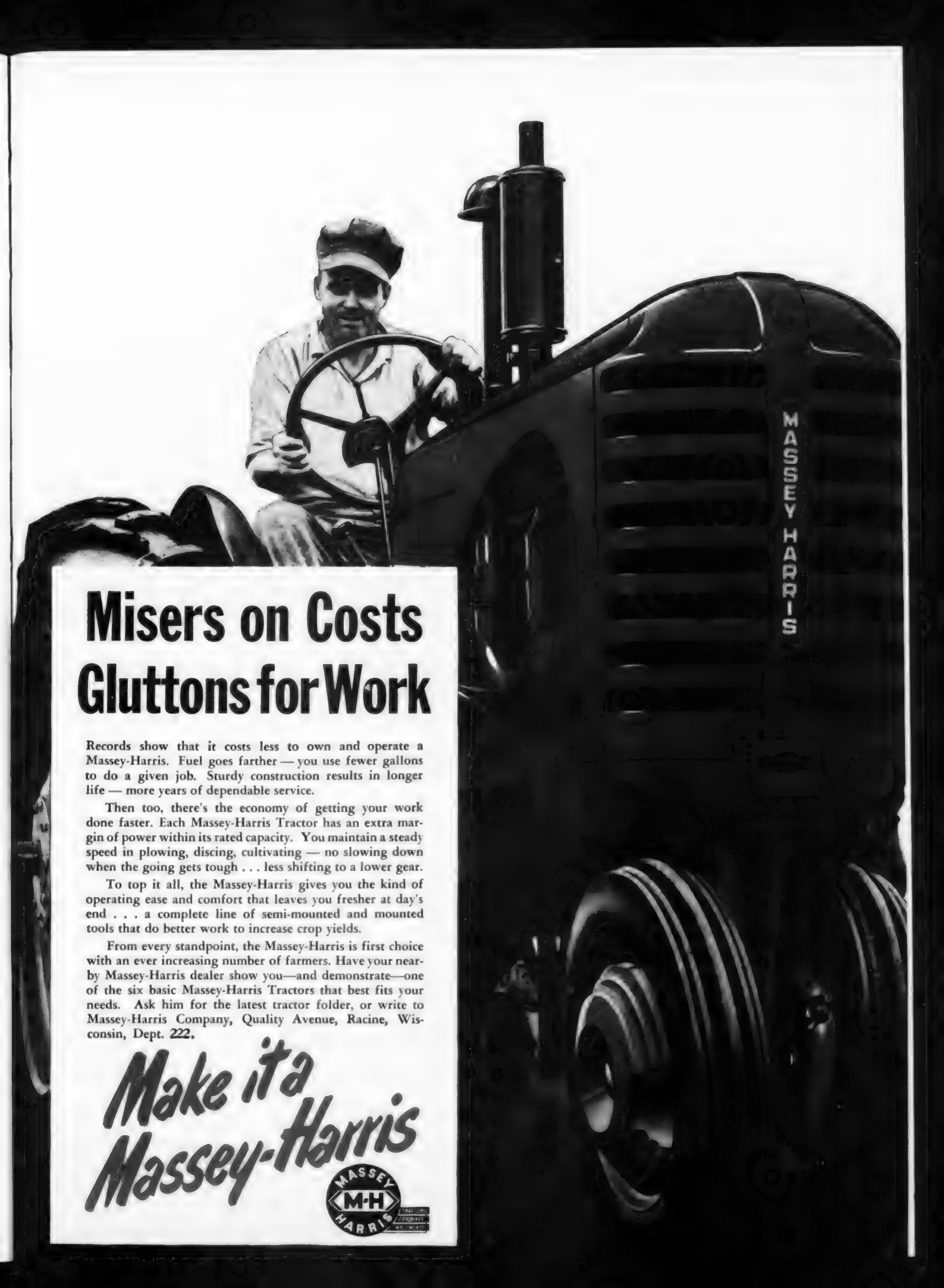
Tow-headed Bobby Schaul, aged three and active as all get-out, is one of six reasons why the Schauls rented a vacant lot next door and put in a scant half acre of parsley.

"We got started," said Mrs. Schaul, a cheerful, pretty woman who looked young to have a boy 23 years of age, "because we needed extra money and with six children I couldn't go out to work. This way, we could make some extra and I could take care of it while Mr. Schaul went to work, without hiring any one else."

Early in October the parsley rows are strikingly green against the black earth, in contrast to the weeds shriveled and brown next to the parsley patch. There had been a frost the night before, and although other plants had suffered, parsley stays pretty green until Thanksgiving, depending on the weather. Deep frost turns it brown.

"If you have too many frosts, the market won't take the parsley, because of the way it looks," reports Harry, "although it is still good as far as flavor is concerned. But it's used mostly for garnish anyway."

Although parsley is a biennial, seed is sown fresh each year. "If parsley is cut from the year before, the first cutting



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From every standpoint, the Massey-Harris is first choice with an ever increasing number of farmers. Have your nearby Massey-Harris dealer show you—and demonstrate—one of the six basic Massey-Harris Tractors that best fits your needs. Ask him for the latest tractor folder, or write to Massey-Harris Company, Quality Avenue, Racine, Wisconsin, Dept. 222.

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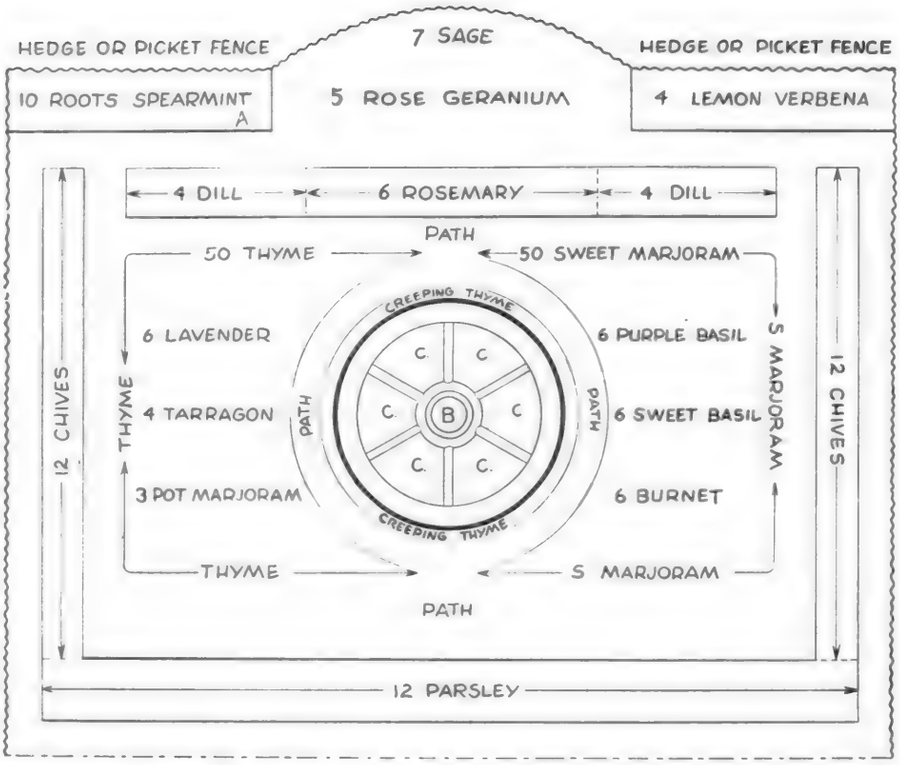

DESIGN FOR A FAMILY HERB GARDEN. This garden, 14 feet by 18 feet, will provide culinary herbs for an average family for a year. It should be well drained and get plenty of sunshine. At (A) sink metal strips, such as old license plates, around the spearmint plants to prevent roots from spreading. At (B) hub of wheel, plant Hen-and-Chickens. Plant summer Savory at (C) between spokes of wheel.

would be all right, but then it would go into seed and it wouldn't be worth anything," Mrs. Schaul advises.

For their patch, the Schauls buy five pounds of curly parsley seed, which is the variety in demand for garnish. There is an extra triple curled parsley (moss curled), which is even more handsome, but it is not as easy to grow. The plain or single parsley has a finer flavor for seasoning, but the *new look* of the curly parsleys make them the glamour girls of their tribe.

There's an old saying that parsley goes to the devil and comes back nine times before it shows itself. It is true that parsley is about the slowest germinating of the farm crops, for it takes four or five weeks to get it up. The seed is planted with a seed drill in March or April, if you can get it in that early. The Schauls have an irrigating system, so their rows are spaced about 20 inches apart, but Mr. Schaul says that where there is no irrigation, you should plant it 24 inches apart, because you preserve more moisture that way. Also when it is too closely planted, it doesn't get enough air, especially during the hot summer, and then it gets yellow.

The rows are not thinned out when the plants appear, because when it is thinned it develops a heavier stem, which is not desirable for bunching. "As soon as you can see the green shoots," instructed

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Harry, "you can cultivate to cut down weeds that are up or about to come up. It only takes about two hours and a half with the hand cultivator each time." They use two knives on it. When there is a very hot, dry summer like the one just past, you cultivate almost once a week, otherwise their light, sandy soil develops deep cracks.

The Schauls find they like Vigoro better than other fertilizer, because, although it is more expensive, it handles better. When you put it on you don't have to worry about its blowing away.

"When the parsley is about three inches high, the Vigoro is put on along side the plants, covered with dirt to let either water or rain drag it down," advises Harry. The parsley is cut by hand, bunched as it is cut, and secured with a rubber band. Mrs. Schaul finds a rubber band faster than twine. From three to four cuttings a season are normal, depending on the weather.

Someone came around in the spring for a company that wanted parsley to express for juice, but the Schauls prefer to sell it bunched, through LaMantia Bros. Arrigo Company, one of the large commission houses on South Water Street, the heart of the commission business in the Chicago area.

Chives

Out on Roy E. Anderson's place in Norwood Park it is very quiet on a late Sunday afternoon, except for the dog barking from the shelter of the barn. Roy is out on the other side of the farm, seeing that all the plum tomatoes are picked, for a heavy frost is expected that night. The day has been an unusually busy one for a Sunday, the cold coming unexpectedly, the temperature dropping to 30 the night before. This is the coldest October 17 in many years and it caught everybody a little unexpected. In common with all the farmers in the Chicago area, Roy is working against time to get all his perishables in without frost damage.

Roy Anderson has a truck farm, growing tomatoes, corn, beets, horseradish and chives.

Roy Anderson is one of the large chive growers in his part of the country, and since he bought out a competitor a couple of years ago, some say he is the largest.

Of the 80 acres he farms, 20 of which were in the original homestead bought from his father, 35 are in chives, with a little less than an acre under glass.

The planting of chives march in orderly rows parallel to the road, as far as you can see. The stems sprawl evenly out in the rows and now in the middle of October, you can't even guess how beautiful they are when the pale lavender-flower heads cover each plant early in spring. It comes as a surprise to most people when they see thousands of blooms, because it rightly looks as though they belong in a flower garden.

Chives can be grown from seed, but Roy gets his new plants from division of the old, early in spring. Any soil suitable for growing vegetables is fine for chives. Manure, for which he contracts, is used; about eight tons to the acre, and also about 500 pounds of 3-12-8 to the acre.

"We keep busy 12 months of the year," explains Roy. "With chives it's not like other farming, where you let up during the winter months. If we're not in the frying pan, we're in the fire, from the fire back to the frying pan. That's the way it is with us."

The busy season on chives starts in the fall when they are moved into the greenhouse. Out in the field they begin to look shabby, the stems sprawling all over. The frost doesn't help their looks any either, but in the green house they are cut back and start greening out again.

Chives are potted up and packed a dozen pots to a crate. The crates, especially designed by Roy, are built so they handle easily in shipping. All Anderson's chives are marketed through commission merchants.

Which is really Hedy Lamarr?

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AN EAGLE-LION RELEASE

(See answer below)

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are ignition engineered for farm use

IT IS difficult to pick the best spark plug from outside appearance, just as it is to choose the real Hedy Lamarr from these photographs. But the new Auto-Lite Transport Spark Plug is built especially for the toughest kind of truck and tractor operation.

If you picked the girl at the right as the real Hedy Lamarr, star of United California's "Let's Live A Little" released by Eagle-Lion, score yourself 100%. Her "look-alike" is Mrs. Desirée Weaver of New York City. You'll be 100% right, too, when you switch to the new Auto-Lite Transport Spark Plug —the plug that gives you the heaviest electrodes on any commercial plug.

The heaviest electrodes of any spark plug made...

for longer life... more uniform performance

THE ELECTRIC AUTO-LITE COMPANY

Toronto, Ontario Toledo 1, Ohio

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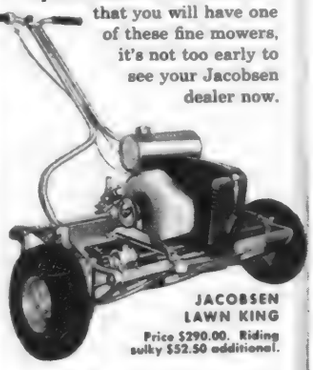
IT'S TIME TO ORDER YOUR
Jacobsen
POWER MOWER
now

This year we hope to supply everyone who wants a Jacobsen power mower. To make sure that you will have one of these fine mowers, it's not too early to see your Jacobsen dealer now.



JACOBSEN LAWN KING
Price $290.00. Riding sulky $52.50 additional.

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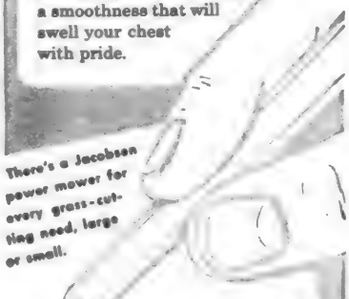

There's a Jacobsen power mower for every grass-cutting need, large or small.

JACOBSEN BANTAM — A youngster can handle this sturdy 1 hp. 18-inch cutting width Jacobsen favorite with ease. Price $122.50.

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Larger sizes up to 60-inch cutting width for golf courses, parks, cemeteries, institutions and estates.

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MANUFACTURING COMPANY
Racine, Wisconsin

Use a Jacobsen and Enjoy Your Lawn

An Herb In The Pasture

Burnet (Sanguisorba Minor) for many years used as a salad plant, was discovered quite by accident, to be a favorite forage crop of livestock. Established along a roadside in Oregon where some cattle passed each day, it was noticed that they invariably stopped, grazing it closely, without apparent damage to the plants.

The area was harvested for seed, and plants grown from it were found to be green practically the year around.

Burnet needs a well-drained soil, therefore it is suitable for hill land pasture. It can stand soils low in fertility, and the deep-rooting system of the plant enables it to stand the dry summers of the area around Corvallis and Silverton, Oregon, where it was tested. It is included with pasture seedings at a rate of three or four pounds to the acre.

The plants make their best growth during the moister part of the year, and during the summer months when it is very dry, the plants become more or less dormant. Even then, some forage is produced after the plant is well established.

We asked Mr. H. A. Shroth, Senior Agronomist of the Bureau of Plant Industry of the USDA, who was testing the plant, whether he thought it could be established as a forage crop in other parts of the country.

"Burnet warrants a test in the East and Midwest as a forage crop," he answered.

"I would doubt it being of very much value in the prairie states such as the Dakotas, Kansas, Nebraska, and possibly a portion of Oklahoma, because of the occasional very long and very dry summers and oftentimes lack of moisture during the winter and rather extreme low temperatures."

Since burnet has a definite cucumber flavor, the question came up whether it would flavor milk. So far this has evidently not been the case, perhaps because burnet is mixed with various grasses and legumes, and it has not been used for straight feeding of dairy cows.

Straight feeding of burnet has been done in western Oregon, on beef cattle and sheep in the form of pasture and utilization of straw from the crop after the harvesting of seed.

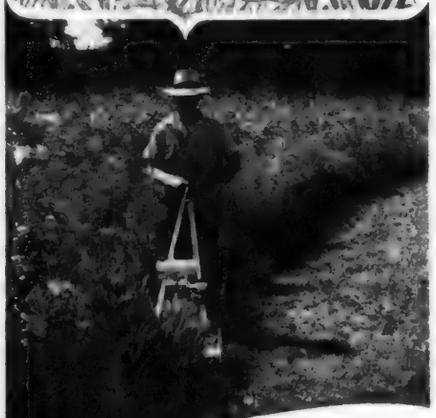
Mr. Oscar H. Loe of Silverton, Oregon, who deals in Arabian horses and specializes in lawn and pasture grass seed production, has grown burnet seed commercially for three years. He has a hundred acres of it in field and pasture, using it as a forage plant for cattle, sheep and horses.

"It is palatable to livestock," he says, "and deer come for miles to feed on it."

An Aside to Mother

With herbs, a little goes a long way; so very little that one large, fresh sage leaf can dwarf the flavor of a stew.

Control Weeds
quickly, easily, with
WORTHINGTON
ROTARY DISC POWER MOWER



Now you can leave that old hand scythe in the shed and clean up weeds the easy power way — with a Worthington retary disc mower. With its smooth-shearing rotary cutters, this efficient mower slices down weeds four feet tall without effort. Ideal for cutting along fence lines, ditches, windbreaks, buildings.

This handy machine also keeps your lawn cut short and trim. A garden cultivator attachment, snowplow and lawn roller are also available.

Inexpensive to operate and maintain. Automotive-type differential. Smooth-running, dependable air-cooled engine. Six models: cutting widths from 20 inches to 62 inches. Get the full story of this labor saver from your Worthington or Jacobsen dealer or send in coupon below. Do it today.

Model No. 1
25" cutting width.
4 hp. engine.

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Dept. F, Stroudsburg, Pennsylvania

Send me full information on this modern way to handle weed control and grass-cutting chores.

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Subsidiary of Jacobsen Manufacturing Company, Racine, Wis.

Herbs should be introduced to the family taste sparingly, one at a time. Dousing with herbs makes mama unpopular. In a tossed salad for four, made of tomatoes, lettuce, celery, radish, and green pepper, two fresh leaves each of basil, tarragon, burnet, and a single two inch spike of dill give the entire salad an exhilarating flavor that distinguishes it from the usual restaurant variety. Whisking the salad bowl once lightly with garlic helps, too. Here's what a few herbs taste like:

Basil—spicy, peppery, but with a fresh, smooth green taste.
Tarragon—like licorice, but cleaner and more bland.
Burnet—a pale cucumber taste, not strong.
Dill—the only thing I can think of is a dill pickle.

CHIVES, on a commercial scale, fit into the regular rotation, but beware growing them if you ever expect to be in the dairy business.

WHERE TO BUY SEEDS & PLANTS

SEEDS ONLY:

Laurel Hill Herb Farm, Falls Village, Conn.
Ferry-Morse Seed Company, Detroit, Mich., and San Francisco, California.
W. Atlee Burpee Co., Philadelphia, Pa.
Henry A. Dreer, Inc., Philadelphia 32, Pa.
Rex D. Pearce, Moorestown, N. J.
Vaughan Seed Store, Chicago 1, Ill.
Twin Trees Gardens, Lynbrook, N. Y.

PLANTS AND SEEDS:

Greene Herb Gardens, Greene, R. I.
Cottage Herb Garden, Washington Cathedral, Washington 16, D. C.
Hardy Herbs, 80 Hill St., Lexington, Mass.
Indiana Botanic Gardens, Hammond, Indiana.
Kiskatom Farm, Mandeville, La.
Lagomarsino & Sons, Sacramento 5, Calif.
Stump & Walter Company, 132 Church St., New York 8, N. Y.
The Toole's, Baraboo, Wis.
Wayside Gardens, Mentor, Ohio. (50c for catalog).

In addition to the above most large seedsmen sell seeds of herbs and many nurseries have lists of herbs in their catalogs.

The delights of eating would be enhanced by a more general use of herbs in American kitchens. The kitchen herb garden, for this reason, is no gamble. The same cannot be said of making a living by growing or merchandising herbs. This leads along a thorny path and is only for those willing to meet the complex demands of time, hard labor and experience.

can't miss..

AC's patented processes make Coralox the finest insulator in spark plug history. Improved electrical insulation, no matter how high the temperature. Better heat conduction. Maximum resistance to heat shock. Less fouling. Harder, stronger, longer-lived.

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Send your tractors out to the fields with the spark plugs that "can't miss"—new AC Spark Plugs with patented Coralox Insulators.

Because this amazing insulator stays clean longer, your engines start right now.

On hard pulls, there's no intermittent misfiring—and that saves fuel.

Wet weather or dry—with gasoline or distillate—these rugged, reliable AC's fire away like clockwork. And they keep doing it.

The patented excellence of AC Spark Plugs with Coralox Insulators has been thoroughly proved, right on the farm. Start spring with a set.

Use AC's—and you "can't miss."

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Easily Installed on Any Truck
IF YOUR DEALER CAN'T SUPPLY YOU, WRITE

BALDWIN IRON WORKS
1440 BARWISE ■ WICHITA, KANSAS

HOW MUCH GRASS

(Continued from page 62)

This is not an absolute method, but a kind of "rule of thumb." Although soils of the same slope vary in the way they will erode, this chart will work for practical purposes in all parts of the country except the plains country or country of that type.

Grass has never been replaced as a soil-builder and water controlling blanket; now we know that it is one of our best crops too, when it is used with grazing livestock. The enthusiastic grass farmers today have many historical references for their case, with none better than St. Peter's, who said in his First Epistle, "All flesh is as grass, and all the glory of man as the flower of grass. The grass withereth, and the flower thereof falleth away."

CHART EXPLANATION

(Continued from page 60)

extra grass is necessary, though, to keep the soil from moving away.

Profile 6 is a seven per cent slope and will require 60 per cent grass, and care in handling corn, if the field is not to be damaged. Corn should be drilled, on the contour. All plowing, cultivating, or planting should be done the same way.

Profile 7. A 10 per cent slope is so steep that corn rarely should be planted. When it is planted it should be handled as in Profile 6. Small grain would be used once in five years in rejuvenating the grass that should be grown on this soil. Lespedeza, of course, would continue indefinitely, but four years is about as long as a good stand of alfalfa can be maintained. The land should be stirred with a field cultivator at the end of the fourth year and a winter grain seeded. It should then go back to grass the next spring or summer. It is not advisable to use lespedeza or alfalfa alone on slopes of this kind as they do not fully protect the ground from erosion. Such grasses as the fescues, brome grass or orchard grass should always be included.

Profile 8. Here we have not only steepness, but hills. The hills may be so numerous and the land so rough that it may not be possible to get over it with any kind of machinery, in which case the best results from rejuvenating the natural grasses cannot be obtained. However, the application of the necessary lime and fertilizer will improve the grasses, even if these have to be applied with an endgate seeder and the seeding done by airplane.

If the land can be cultivated, the grasses can be built around alfalfa, but if it cannot be cultivated such grasses as the natural blue grass with birdsfoot trefoil and lespedeza would make up the mixture.

THE AUTHOR

C. M. LONG was born and raised on a farm near Columbia, Missouri. After graduating from Missouri University he taught for two years at Oklahoma A. & M. For the next few years he operated his own farm and managed other Missouri farms until he became a county agricultural agent. He worked for the Holstein Friesian Association and eventually went to Purdue University to serve as Soil Conservation Extensionist. While at Purdue he worked out the plan for his "Farm Clinic" which he now operates in West Lafayette, Indiana. Long and his staff, who specialize in grass farming, have analyzed and made management recommendations for 90,000 acres of farm land in Ohio, Illinois, and Indiana.

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V-C Fertilizers are famous for their crop-producing power and their free-flowing, easy-drilling quality. V-C Fertilizers are produced in various grades and analyses, so that there is a V-C Fertilizer for every crop on every soil. V-C Fertilizers make the good earth better!

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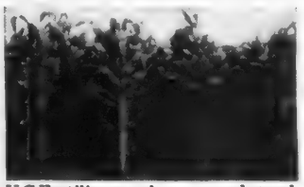

V-C Fertilizer produces a good stand, unifom growth, profitable yields.

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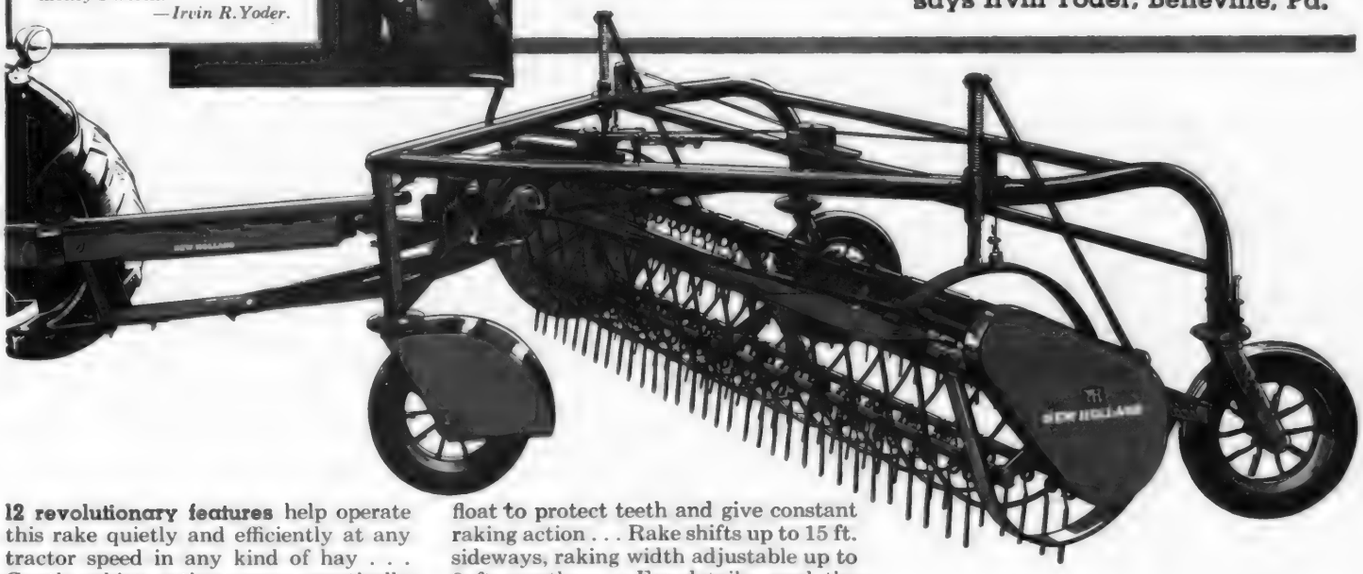
"With New Holland's fast, new power take-off rake we kept ahead easy. That New Holland rake worked faster, quieter and bent less teeth than any rake we ever had before. We raked over 200 acres of straw, alfalfa, soy beans, timothy and clover as fast or as slow as we wanted. I'm sure glad we got it. With New Holland hay-making equipment, you really get your money's worth."

—Irvin R. Yoder.

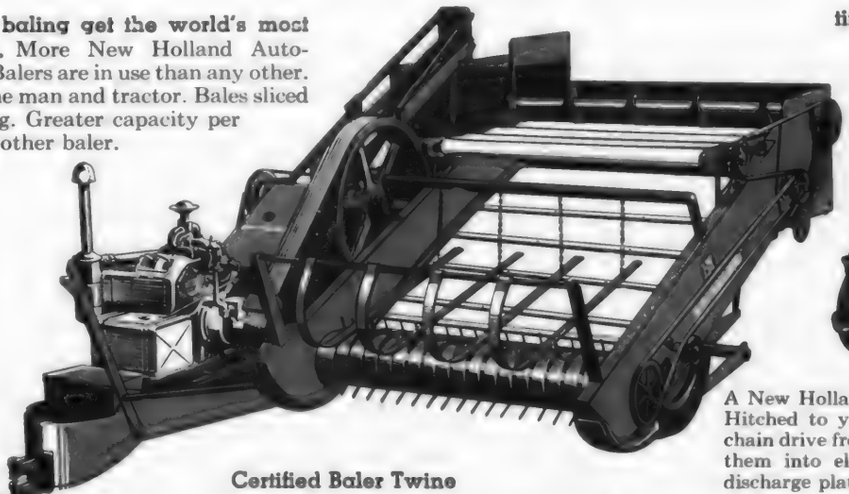
"One NEW HOLLAND power take-off rake does the work of two ordinary rakes!"

says Irvin Yoder, Belleville, Pa.

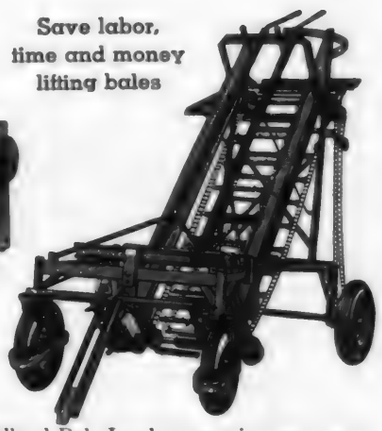


12 revolutionary features help operate this rake quietly and efficiently at any tractor speed in any kind of hay . . . Gentle raking action means practically no leaf loss . . . Reel and rod assembly float to protect teeth and give constant raking action . . . Rake shifts up to 15 ft. sideways, raking width adjustable up to 9 ft. swath . . . For details, send the coupon below.

For sure, fast baling get the world's most popular baler. More New Holland Automatic Pick-up Balers are in use than any other. Operated by one man and tractor. Bales sliced for easy feeding. Greater capacity per hour than any other baler.



Save labor, time and money lifting bales



A New Holland Bale Loader saves in every way. Hitched to your truck or wagon, it operates by chain drive from rear wheels . . . lines up bales, lifts them into elevator, carries them to adjustable discharge platform, in one quick action.

See your dealer for information about other New Holland products: Hay Chopper-Ensilage Cutter Cylinder Corn Sheller • Portable Tractor Saw General-Purpose Mixer • Cylinder Husker-Sheller Hydraulic Loader • Hammer Mill • Farm Belting

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● The United States Testing Company, one of America's oldest and largest impartial testing laboratories, has awarded its Seal of Approval to New Holland Baler Twine, the only twine that measures up to its rigid standards of quality, strength, durability, uniformity and rodent repellency.

New Holland Black Twine is the No. 1 choice everywhere. You won't find a stronger, easier-running, better-knotting twine at any price. New Holland Treated White Twine is also available. Both are packaged in tangle-proof, collapse-proof cartons. Order early to be sure of all you'll need.

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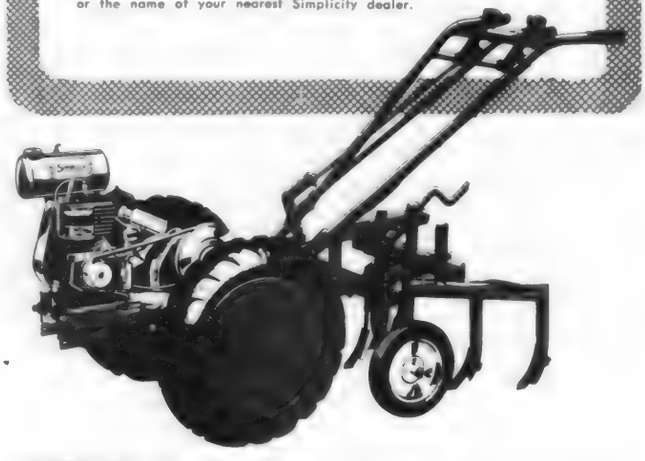

MANUFACTURED BY
SIMPLICITY MANUFACTURING COMPANY • PORT WASHINGTON • WISCONSIN

LETTERS (Continued from page 8)

them is to wait until around August when the young bats will be leaving the roosting place with their mothers and then seal off all entrances to the roosting place. He also tells me that Potassium Cyanide and tear gas are both used to get rid of bats, but since there is considerable danger in using these poisons he would not advise any untrained person to attempt their use.

It would probably be best to get a professional exterminator to handle the job.

September 2, 1948

Why did you have to get me started on bats? As I mentioned to you in my last letter, I spoke with Karl Maslowski. He wouldn't believe that I had that many bats. He and his associate, Woody Goodpastor, came the following Saturday and climbed into the attic. When they came down they had taken a number of photographs and had captured a hundred bats which squirmed and chittered in a sugar sack. They estimated my bat population at three to four thousand. The naturalists were well sprinkled with small red bugs that looked like stunted bedbugs or large economy-size chiggers! They mentioned that bats do carry chiggers; some carry the type that spread scrub typhus. And here I had been gloating about how few mosquitoes we had and how well I had balanced nature to my advantage!

I decided the bats must go. I planned a three-pronged offensive: Sulphur candles, lighted at night after they had left; sealing the holes from the inside during the day when the light would show me their location; spraying with DDT in oil to kill the eggs of bugs. With all this, I still had bats.

With my first attack a failure, I started a new campaign. I bought 25 pounds of naphthalene flakes to spread over the floor of the attic as a deterrent.

In spite of this vigorous campaign, I failed to discourage them. I finally waited until they cleared out for the South and then I sealed off openings into the attic.

Grant G. Cannon
Farm Quarterly

THIS ONE WORKS

Sirs:

Who wrote the article "Winter" in your latest issue? I was a city slicker once myself, and when I married in the spring of '46 I looked forward eagerly to those long winter evenings I'd heard so much about. I'm still looking.

My husband would have written in himself, to tell you that farming is not the snap in Winter you seem to think, but he's too busy.

Mrs. Louise McIlvaine

Whitford, Pa.

How times have changed.—Ed.

WE'RE NOT STUMPED YET

Sir:

I understand that a chemical solution is available that can be used or placed in tree stumps that will completely eliminate them. Can you tell me where such a solution can be secured?

M. L. Gardner

Detroit 7, Mich.

The chemical you want causes the stump to rot so it can be burned out completely. Drill ½" holes 10" deep six inches apart over the surface of the stump. Fill the holes with ammonium nitrate and drive a cork into each hole. If used on a green stump in the spring, you can, in August, pile brush over the stump and burn it out roots and all . . . This treatment requires from one to two pounds of chemical for the average sized stump. Ed.

WHO HAS A MILLER'S HISTORY?

Sir:

As the great, great, great grand-daughter of William Galliers of Wigmore Grange, who was the close friend of Benjamin Tomkins and his associate in the development of the Whiteface, "the Hereford story" as you call it (*FARM QUARTERLY*, Autumn 1948) was part and parcel of my childhood. Whenever Englishmen gathered around our kitchen stove, over their hard cider, sooner or later, Hereford cattle became the main topic of conversation.

My father, William Galliers, was born in the village of Wigmore and when a boy of 9 years, went to live with his grandfather on a large stock farm near Wigmore, Herfordshire. At 29, he left England and came to Toledo, where he later married and raised his family.

A number of years ago and quite by accident, a niece of mine in California happened upon T. L. Miller's History Of Hereford Cattle, which belonged to her friends, the Goslings who figure in the Sotham History Of Herefords In America.

She had been raised with no knowledge of her family's connection with Herefords so was overwhelmed to find Miller's book, in part, a history of her family. It is because of this record of my family, I am writing you. I have tried repeatedly, without success, to obtain a copy of Miller's History Of Herefords. I would pay almost any price to obtain a copy for my family.

Miss Amie Galliers

Toledo, Ohio

FARM MARKET PROVES OUT

Sir:

I want to especially thank you for the article, "Markets by the Roadside", Summer 1948 issue. My husband built a table exactly like the one over the title of the article, and as we had planted some extra rows of sweet corn, tomatoes, etc., this stand came into use. This year we are expanding our efforts, as we are located on a secondary highway near golf courses and lakes. We found the facts in the article true and helpful.

Your publication has really grown and I know it will help people to do the same.

Mrs. Lawrence Anson

Richland, Mich.

THE TIP WAS TIMELY

Sir:

Last spring you published an article, of which I had a part in authorship, telling of the premium price awaiting producers of white corn. Growers of white corn hereabouts are collecting a premium of 30 cents a bushel over yellow corn—proving that all the gold is not in them there cribs of yellow corn. Some who held 1947 white corn until the spring of 1948 pocketed a 55 cents per bushel premium.

Incidentally, a white hybrid corn K-2234 again frequently topped official corn yield tests (both white, yellow, hybrid and open pollinated) this year in southern Nebraska and northern Kansas.

Robert R. Johnson

Beatrice, Nebraska

THE TWO-FACED CAT

(Continued from page 79)

riod she is extremely promiscuous and will entertain every tom in the county.

During this process of many matings, it is quite possible for the individual kittens of a single litter to be fathered by different males. When her heat period ends the toms spend another 24 noisy hours on the premises and then disperse. The period of gestation lasts from 55 to 69 days, with most cats giving birth at 62 days. Zoologists say this wide spread in the gestation period is caused by past mating with wild cats, which have a different length of gestation.

The expectant mother doesn't seem to realize she is changing shape and will try to go through narrow openings that she was once able to use and may kill her young and even herself.

The cat will produce four to eight kittens in a litter, but prolific animals have been known to throw as many as twelve. Wholesale production of this sort sets the owner to canvassing all of his friends to find homes for his surplus kittens. He will probably find that half of his friends hate cats and the remainder usually have too many themselves. Faced with the grim task of disposing of the kittens, he has several choices. Humane societies will usually do away with them. The usual method of extermination is to sack them up and throw them into the creek. A more humane method is to close them in a box with a sponge of chloroform.

True believers in the powers of cats feel that it is a waste of good money to buy a barometer if you have a cat around. A Baltimore cat named Napoleon predicted rain by putting its head between its paws with skull to the floor. In 1930 the news-

50% Yearly Return on Your Investment

THE Leach Silo Unloader pays for itself in two years or less. That's a 50% annual return! Bigger milk checks — reduced labor costs — better silage and less spoilage — and safer, more pleasant working conditions — all contribute to this 50% return. Certainly, it's a profit that progressive dairy farm management cannot overlook. Get the facts as they pertain to your own farm and feeding conditions.

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- *Increased* MILK PRODUCTION . . . Users claim that the increased palatability of the "liberated" silage increases milk production up to 10%.
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The LEACH Barn Cleaner . . . Built in two models: 3 H.P. for average-size barns; 5 H.P. for large barns. Return coupon for full information.

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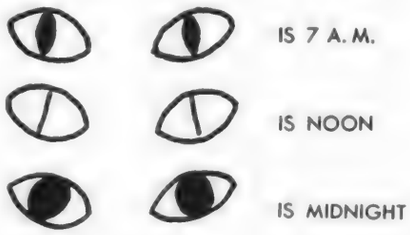
papers of Baltimore carried the official prediction of "continued dry" after a long drought. Napoleon disagreed and his owner, Mrs. Fanny de Shields, telephoned the paper to inform them of their mistake. The cat proved to be right and the paper began publishing Napoleon's predictions.

Cats are very sensitive to vibrations and there are many tales of cats who have reacted to an earthquake long before humans could feel the tremors. They are described as showing sudden fright, hair on end, ears flattened and eyes shining, mewing and raving. Much this same reaction has been noted in dogs, horses and other animals.

Cats may not have nine lives, but scientists have observed that they do have the faculty of landing on their feet from any position when falling, which helps prolong the one life they have. They have been known to survive a fall of four stories, but can make the twist when dropped from as low as six inches.

The Chinese were realistic about cats. They ate them. They also used them as time pieces. By looking into the cat's eyes and noting the size of the pupil they judged the time of day. Thus:



Some misguided folk "who just haven't the heart to kill those sweet little kittens" follow the easy but cruel course of taking them out for a long ride and losing them. Both cat lovers and those who hate them are in complete agreement that this is the worst possible way to get rid of the surplus. Beside being inhuman, the stray cat quickly turns into a wild animal and does an enormous amount of damage to the wildlife in the area. The strays are forced to make their living on birds, insect eating shrews, rabbits and other rodents and so give all cats a bad name. They also, indirectly, cause the death of many domestic cats. Game wardens and others interested in protecting wildlife find it impossible to distinguish between a wild stray cat and the farmer's pet who is out in the woods for a stroll. They usually follow the old western practice of shooting first and asking questions later.

Both males and females can be altered to do away with the annoyance of their constant reproduction. Male cats should be castrated between four and eight months of age and females spayed between two and six months. The operation, which can be done by an experienced veterinarian, is not serious at this age, but is dangerous if delayed until maturity. This operation improves the hunting abilities of the male cats, but the females that have been spayed seem to lose their zest for the sport.

A study of aged cats made by Ida M. Mullen for her book, "The Science and the Mystery of the Cat," seemed to show that the neuters lived longer than the male cats, but this may be due to the dangerous life led by most males. The average life span of the cat is 14 years, with some oldsters reaching their twenties and a few ancient cats passing the thirty mark, which is roughly equivalent to a hundred years of human existence.

Dogs and automobiles keep most cats from dying of old age. Dogs seem to have a natural hatred for cats, but it cannot be very strong for there are innumerable cases where dogs and cats have been trained to live together without fuss or

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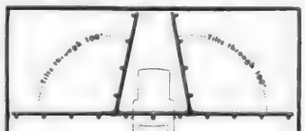

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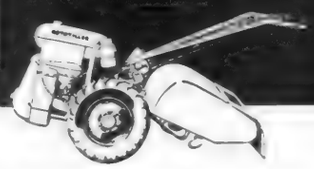

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loss of fur. During recent years the cat haters, ailurophobes is their fancy name, have organized a number of short lived societies for the extermination of the cat. One of the most vitriolic cat haters, the late Rockwell Sayre, a Chicago banker, felt that it was "toadying to depravity to keep a cat around the house" and offered rewards for their extermination. His slogan was "A catless world quick."

On the other side of the fence are the cat lovers who have *their* societies for the protection and care of the animal. They publish magazines about their pets and they number among them individuals who match the fervor of the anti-cat people in their devotion to the animal. Fortunes have been left for the establishment of cat havens and even for the care and preservation of individual cats.

Impervious to the furor of the two groups, the cat goes its individualistic way killing rats and mice, bats and bugs, snakes, lizzards, fish, and birds, for all these are its natural prey.

ACETONEMIA

(Continued from page 86)

In such cases, treatment for Acetonemia will not cure the cow. Diagnosis requires that the chemical test be supplemented by common sense and observation.

There are other theories about the cause of Acetonemia but even the experts can't agree on them. Here are a few possibilities, all conjectures, and subject to change without notice:

1. The ration may contain starches and sugars so complicated that they cannot be broken down for body use.

2. The ration may not contain enough starches and sugars of even the simpler varieties.

3. Fat digestion may be stepped up to the point where ketone bodies are produced faster than they can be broken down by the action of normally sufficient sugar.

4. Something happens that prevents the storage of glycogen reserves against a time of need.

5. Something happens that keeps glycogen reserves from becoming available when they are needed for breaking down ketone bodies.

When veterinarians dwell too long on the last two impossibilities they begin mumbling to themselves. Maybe the *something* is a disturbance of the ovaries that interferes with the production of hormones that are essential for normal body processes. Maybe it is concerned with a disturbance of the pituitary gland, that governor of all body activities. Maybe it is really a disease of the liver that somehow interferes with the destruction of

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acetone. Maybe it is something concerned with a lack of certain vitamins or minerals. Maybe it stems from the tuning in of Superman programs on the barn radio at milking time or is somehow tied up with the sign of the moon. Anybody is entitled to a guess.

It is apparent from the above that Acetonemia, and its causes, are a bit on the complicated side. For all of our scientific advancement during the past hundred years, the inside of a cow still remains as the darkest place on earth.

The dairyman has one clear course of action: as soon as the disease is suspected, send immediately for a veterinarian. He probably won't know any more about the exact cause than the owner, but he will have a variety of drugs and equipment. Along with these necessities he will have the skill and experience needed to treat the animal. Not only that, but he will be a handy chap to have around for confirming a diagnosis. All the treatments in the world are no good unless they are given in the right amounts for the right diseases, and it's awfully easy to make a mistake in diagnosis, so you'll probably feel better if you have a veterinarian on the case if for no other reason than two heads are better than one.

Should the veterinarian be able to diagnose the trouble as Acetonemia, routine practice first calls for supplying the missing sugar to the blood. This is usually given by way of the jugular vein in the form of a 40 per cent or 50 per cent solution, and a pint is the usual dose. From this point on, the procedure depends pretty much on the practitioner in charge, for each one is apt to have his own pet treatments and methods.

The cow may be given chloral hydrate or pituitary extract or vitamin A or various hormone products. The owner may be instructed to give molasses or corn syrup on the feed for a few days, or some kind of medicine may be left for daily administration.

Whatever treatment is used, others may have to be tried. The cause may be complex, a combination rather than a single one, and old stand-by remedies may fail. No single treatment will work in all cases. If changing of treatments becomes necessary, trial and error usually results in something being eventually found that works, but there is always the occasional cow that nothing seems to help.

If one of your animals falls into this group, don't be too quick to accuse your veterinarian of being a dumb cluck. We have a long way to go before we can be sure about diagnosing the causes of Acetonemia.

Dairymen, being practical men, are asking about preventing Acetonemia altogether. Why not just supply extra sugar in the feed? Unfortunately, prevention isn't as simple as that, for right away we run smack against the problem of what

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caused the lack of sugar in the first place. Something may be wrong in the body that prevents sugar from being used, even though it is fed in ample amounts. The best preventive is probably good health. A herd in top condition is susceptible to few diseases.

Elmer Zimmerman, Ft. Atkinson, Wisconsin, has had only one diagnosed case of Acetonemia in 20 years. He is milking 37 cows and ascribes his good luck not to the rarity of the disease, but to the fact that he has kept one eye on his feeding program to prevent it. "Since feeding is a big factor in Acetonemia, I lock the stable door before the horse is stolen," he said. "I believe that grass silage put up with 40 pounds of black strap molasses to the ton is an excellent aid in the prevention of Acetonemia."

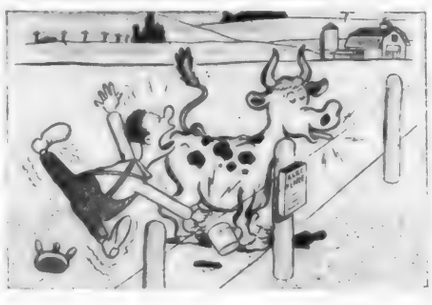
A neighbor of Zimmerman's, Harry Mode, says that there are a great many cases in his locality every year and he regards it more serious than milk fever because it takes a cow longer to recover. He believes that it is much more common than formerly because cows have been bred to give more and more milk and this increases the possibilities of the disease. He also feeds molasses.

Maynard Grace, operator of a dairy at Ft. Atkinson, Wis., does not agree with Zimmerman and Mode that Acetonemia can be prevented by proper feeding. "I had 17 cases the year we had the most trouble and my cows got the best possible feed and care that year. Last year we only had two cases," he said. "I doubt that we have more cases of Acetonemia today than we had 15 or 20 years ago. In the old days it was just as common, but was diagnosed as something else."

As good insurance, most experts believe in the feeding of corn syrup or molasses to high producing cows for a couple of months before and after freshening. When supplied at the rate of about a pound daily during this time, the practice is often quite effective in preventing Acetonemia. This feeding routine doesn't always work, but it is well worth trying in herds where Acetonemia is present. Molasses at least won't harm the cows, and it may prevent trouble.

THE AUTHOR

DR. JACK BAILEY is a veterinarian practicing in Wisconsin, the dairyland of America. Born and reared on a dairy farm in the same state, he has been interested in cows since he was old enough to walk to the barn to watch his father milk. He was a well known herdsman for years before entering the Veterinary College at Cornell University. His reputation as a writer on farm subjects is only second to his reputation as a veterinarian. Readers of *Farm Quarterly* have learned that his articles are practical and sound.



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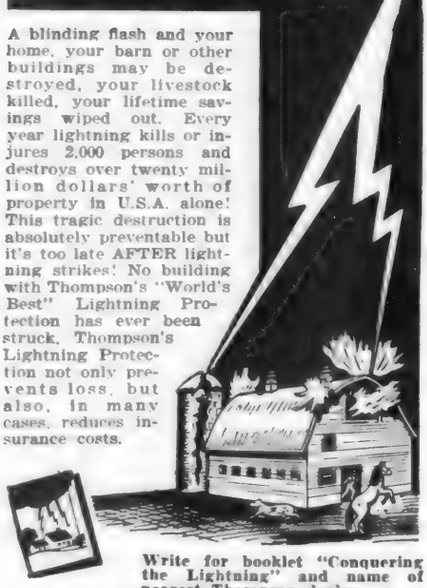

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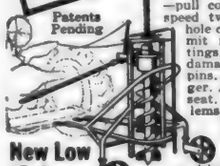

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SUNFLOWERS

(Continued from page 66)

Combines were designed to harvest small grains with their short slender stems and require some conversion and adjustments to handle the tall woody sunflowers with their large seed heads. Since each make will have different adjustments farmers will have to work out the changes with the dealer. The problem is to raise the platform so that as little stalk as possible is cut with the head; fill in the reel so that the stalks will not wrap around the slats, and lengthen the reel arms about 12 inches so that they will extend over the top of the plant. This reel extension should be made on a 30 degree forward angle to the rest of the reel arm to give a slight scooping action which will

Converted combine harvesting sunflowers.

minimize shattering. Rub bar or rasp type cylinders are recommended over the tooth type which has a tendency to hull the seeds and shred the heads and stalks so much that separation is difficult. The cylinder speed should be reduced to about one-half of that used for the small grains and the concaves should be opened wide.

Several of the implement companies have developed attachments for their machines to adapt them to the crop. The extension service of the North Dakota Agricultural College at Fargo, North Dakota, has prepared a mimeographed report on the conversion of combines for sunflower harvesting.

When Jim Curtis harvested his 1947 crop he knew all of the recommendations that the experts had made for converting his combine, but the one thing they hadn't told him was where to get the material to do the job. "We went to every lumber yard and hardware store around here," he said, "and were finally able to get some canvas to fill in the reel, but we just *couldn't* buy the lumber and hardware for making the reel extensions. I even tried to get some bamboo fishing poles so that one of the men could use a pole to push the heads down to the reel, but they weren't to be had. We went ahead anyway; you have to go ahead when you have a crop that is about ready to shatter. The men had been working for a couple of hours and were at the other end of the field when I heard one of them yelling, 'Mr. Curtis! Mr. Curtis!' He sounded so excited I was sure one of them had got caught in the machine and that I had a suit on my hands.

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"I guess that was the lawyer in me," Curtis said with a laugh. "Anyway, I ran down the field and found that they had discovered that if you strip a sunflower stalk you could use it to direct the heads into the machine. We worked all day and found that you could use a stalk for a couple of hours before it broke. This year we have our equipment rigged up, but Jake's ingenuity sure helped out. We made a very good harvest of 2300 pounds of seed to the acre that year."

Curtis' harvest of 2300 pounds to the acre is more than "very good": it is downright sensational for a commercial size crop. Very good crops run as high as 1500 pounds to the acre and the average is nearer 700 to 900 pounds. Tests run by Canadian scientists have shown that yield is directly related to the spacing of the plants in the row and that a five to six-inch space between plants in rows 36 inches apart produces 50 per cent more seed than those with a 10 inch spacing. Curtis plants at about this spacing. His cost of planting, cultivating and harvesting the crop was comparable with the cost of his corn crop, which is harvested by machine.

Diseases And Pests

Little disease or insect damage has been suffered since the beginning of commercial production in America, but it is known that the plant is quite susceptible to both. A stem rot called Sclerotinia, and rust, are the two major diseases that attack the crop. The preventative measures are the same for both, deep plowing of the stubble after the crop is harvested and avoiding planting sunflowers on the same land more than once in four years. Planting on land which was last used for potatoes, beets, alfalfa or sweet clover should also be avoided since these plants can be carriers of diseases that attack sunflowers. It is hoped that some of the new varieties that are being developed will be resistant to rust and possibly to Sclerotinia.

Insect pests are more numerous than the diseases which attack the crop. Beside the usual varmint that chew on most crops, wireworms, cutworms, beet webworms and grasshoppers, the sunflower is attacked by its own special insect enemies, the sunflower moth, the sunflower leaf beetle, and a species of Phalonia which has not been given a common name that can appear in print. The delicate gray sunflower moth lays its eggs on the head of the plant at about flowering time and the larvae have a fine destructive time eating the seeds and tunneling through the head. Fortunately, the new hybrid, Advance, is resistant to the bugs. Deep plowing of the stubble will help eradicate the Phalonia and spraying will be effective with this and the other pests if they should attack in numbers.

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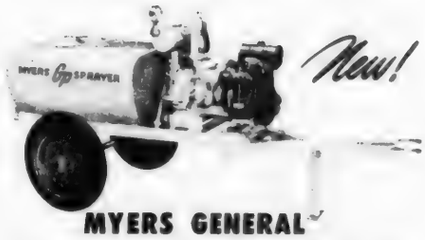

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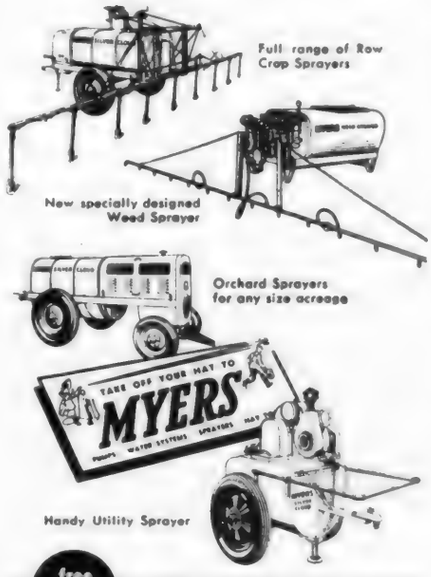
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to dry so that he can harvest he will find the crows sampling his produce and calling in their friends, relatives and other birds for a feast. These ravenous birds have cleaned out whole fields of the ripening crop and left the farmer staring at the bare faces of the seed heads. The fields that are hardest hit by crows seem to be those that are near woodlots or brush areas where the birds seem to have regular fall and spring fly-ways. Last year Curtis kept his shotgun hot; he managed to frighten off the marauders though he killed but a handful. It was at first thought that the new hybrid would not be touched by the birds because the head faces the ground when it matures, but the crows didn't mind a bit, pecking through the top of the head to get the nutritious seed below.

Seed For The Birds

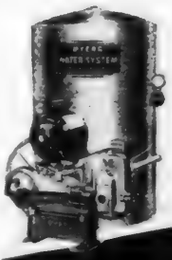
It is not surprising that birds attack the fields of sunflowers. For years we have been raising the crop for poultry and bird seed. The trick is to get the seed to the buyer before the birds get to the seed. John K. Baldon of Newtown, Ohio, raises sunflowers for bird seed and also makes the plants serve a secondary need. He has planted the Russian Mammoth variety at four to six-foot intervals throughout his 10 acre strawberry patch. "I decided to try this system," Baldon explained, "to see if I could provide a little shade for the strawberries and raise some poultry feed at the same time. I had intended to use all of the seed myself for the chickens, but people driving along the road have watched the plants grow and have stopped and left orders for seed for winter feeding the song birds."

The leading states in production for the poultry and bird seed market are California, Illinois and Missouri. Each of these states has, at one time led the field, but California is now out in front. Here the sunflower is grown under irrigation. In true California fashion the Russian Mammoth variety has been renamed the California Greystripe and competes in popularity with the California Manchurian Plant developed by Northrup, King and Co.

The New Market

There has been a small but steady market for sunflower seed as a feed for tame and wild birds for a number of years. Pre-war prices for the crop averaged three to five cents a pound but as other agricultural prices rose so did the price of sunflower seed. During the past two years it has been around 13 cents a pound. Most dealers, however, feel that it would be unwise for farmers to count on the price remaining this high, for a bumper crop would probably drop the price to pre-war levels.

A new market for the oil producing seed was established in 1947 for the northern growers. In that year Cargill, In-



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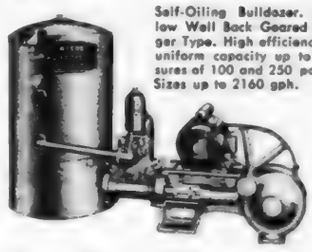

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corporated, the large grain dealers in Minneapolis, Minnesota, decided to experiment with the development of this crop. They entered into contract with some 50 growers for the purchase of the seed from 2500 acres in the northern wheat area in order to find out what the results of sunflower growing would be in the United States as compared with Canada's experience. The idea appealed to other farmers and a total crop of 6500 acres was planted for oil production in 1947.

Since there was no market established Cargill was forced to set the price of the seed. They used flax as a standard and agreed to buy sunflower seed at 75 per cent what they paid for flax on a pound for pound basis. This arrangement placed the price of the seed at around 16 cents a pound. They found that this price was too high since both flax and linseed oil prices were pegged by the government whereas sunflower seed oil was forced to compete with the oils from soybeans, cotton seed and other oil producing seed. The 1948 price was therefore, based on the price of vegetable oils and protein meals. This lowered the price to around eight cents a pound during most of the selling season and even lower as a surplus developed. Cargill points out that these variations in price are bound to take place with any new crop until the market for it becomes stabilized.

Sunflower seed oil is being used in the production of margarines and shortenings, as a salad oil and in the manufacture of heat resistant paints. In the fish packing industry it is now preferred over olive oil. The meal that is left when the oil is removed has the highest protein content of any of the vegetable concentrates with a rating of 52.7 per cent. The meal is low in crude fiber and is unusually rich in bone-forming calcium for a vegetable concentrate. It is also high in elements of the vitamin B complex, thiamin and particularly niacin. Scientists from the University of Illinois are conducting experiments with the sunflower meal. In feeding laboratory animals they have found that, as a protein concentrate, it is comparable to tankage, soybean meal, meat scraps, and peanut meal. The Illinois scientists have also worked on a flour from the sunflower meal as a food for man. They find that from five to ten per cent of this flour can be added to white flour to improve its value as a food.

Whether or not more fields are planted to sunflowers depends somewhat on the continued use of the oil and flour for food and for industrial purposes. Both seem to have merits which will result in an increased demand. They have graduated from the kitchen garden into the fields. There they will have to compete with the usual crops which the farmer grows for cash.

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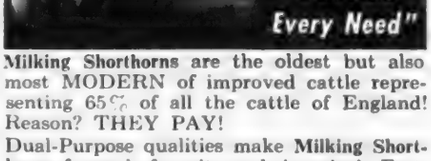

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NEWCASTLE DISEASE (Continued from page 41)

laboratory and field tests. In the spring of 1948 he felt that it could be tried on field flocks and production of the vaccine was undertaken by the Vineland Poultry Laboratories. At about this same time workers at Lederle Laboratories used a virus strain that could be modified or weakened during production by the use of incubated duck eggs instead of hen eggs. Now, both strains are being used to prepare living vaccines. These vaccines have temporary approval of the Bureau of Animal Industry.

The living vaccine overcomes the main weakness of the killed vaccine, that of short time immunity. But just how long the immunity from the live virus vaccination will last is a question which only time and experience can answer with certainty. It can't be said yet that it gives lifelong immunity since the living vaccines now on the market have not been used long. We do, of course, know that active infection in field flocks makes the birds resistant for several years. The Huntington researchers found that hens which came from a Newcastle infected area in 1941 and were kept on clean premises thereafter were still highly immune in 1945. But it's a pure hope that we'll get the same prolonged and substantial immunity by vaccination with the newer strains of living vaccine as from natural infection. It's quite easy to be optimistic about new vaccines and drugs—before all the facts are in. It's a temptation some people, including writers and advertisers, may yield to, and cause the poultryman to expect too much, take unnecessary risks, and incur losses.

The ideal result of live virus vaccination is a strong durable immunity with no undesirable vaccination or side reactions. This, unfortunately, cannot be counted on. Difficulty is most likely to follow if they are used in the very young or in animals in production. Serious consequences may follow where the vitality has been lowered by other infections, parasites, improper feeding, housing or other causes. Hence, the poultryman must observe the same precautions that the swine man does when he plans vaccination against hog cholera. Living hog cholera virus is given with the double treatment and the mild form of cholera which follows normally, may become severe if other diseases or abuse in feeding complicate the situation.

Other diseases may reduce resistance to cholera, or Newcastle disease, and likewise, live virus vaccination reduces resistance to other infections and disturbances. Because of this hazard, it usually pays the livestock raiser to have his veterinarian look over the herd or flock. The vet can often detect the slightest and earliest signs of lowered vitality, or of disease. If the herd is not in a satisfactory state of health the owner may be advised to rely upon the shorter immunity which he gets with anti-hog cholera serum alone, or the serum plus the killed hog cholera vaccines. The risk is much less, even though revaccination must be done later.

Vaccination against Newcastle isn't always necessary or even desirable. Vaccination is usually desirable only when infection is already present on the farm or on nearby premises, or where it is quite likely to come in from more distant points. To vaccinate because others in another township or county are vaccinating isn't good reasoning. Seldom should one start unless Newcastle disease is active and prevalent on nearby farms or areas, or where there is a definite likelihood of its coming in with feed bags, trucks, used egg crates, or with infected or exposed poultry.

At present prices Newcastle vaccine is not expensive, running around a couple of cents a dose. The living vaccines are applied by injection into the leg or breast muscles. Living vaccine may also be given, as is fowl pox vaccine, by the skin puncture or stick method, where two needles carrying the virus are pricked through the skin of the wing web. Many poultrymen are familiar with the stick method of vaccination, but still seek the advice and assistance of their veterinarians. It offers them a certain degree of insurance against trouble, especially when living vaccines are used.

The killed vaccine is injected into the leg or breast muscles by a hypodermic syringe. The Cutter Laboratories, which produce the killed vaccine, recommend that poultry be given two shots of the vaccine spaced from 7 to 30 days.

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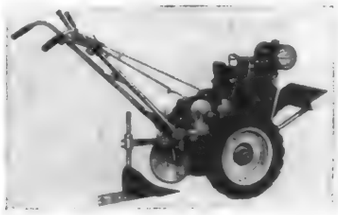

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Assurance that the flock is of suitable age and in good health when treated with living Newcastle vaccination is only the first consideration. After vaccination, protection against unfavorable temperatures, feeding or other conditions, or exposure to other infections is highly important, especially during the next two weeks. The vaccinated birds should be kept away from unvaccinated stock for a month if the living vaccine is used, for the vaccine virus may spread to the susceptible birds. Finally, it is a good precaution to determine whether good takes have resulted. The Massachusetts scientists found that stick vaccination produced a "take" in the form of a reddened swelling several days after treatment. Blood samples taken in two weeks, as for pullorum testing in the laboratory, serve to check on the effect of vaccination. Likewise, with the onset of production, a number of fresh eggs from different hens may be sent to the veterinary laboratory. Tests of egg yolk serve just as well as blood serum to show to what degree the flock is immune. It also will tell what the flock can expect in the way of immunity in the chicks hatched. Recently hatched chicks can be tested for antibodies to tell if they are from immune mothers.

There Are Exceptions

There are cases where the hens are being vaccinated even though there is no disease in the immediate area. Mrs. G. L. Murphy, who runs a poultry farm in Wisconsin, ran into such a situation and called in her veterinarian, Dr. R. D. Jones, for advice. "The hatcheryman who buys our eggs just called, Doctor," she explained, "and wanted to know if my layers had been vaccinated against Newcastle. We've got a good healthy flock here and I don't know of any Newcastle in this whole area. I hate like the dickens to start vaccinating the birds right when they are in production."

"You're right about this county being free from Newcastle," Dr. Jones said, "but the hatchery probably sells chicks to farmers in areas where they have a lot of it. You see, chicks from immune hens get immunity by absorbing the yolk, that will protect them for a month after hatching. And it is in just this very early period that death losses from Newcastle are heaviest. That is why many hatcheries are demanding eggs from flocks which have been vaccinated or have recovered from an attack of Newcastle. It's too bad we couldn't have caught this earlier," Jones sympathized, "if we are to give the chicks a temporary immunity we will have to give the hens at least two shots of the killed vaccine and, now that they are in production, just handling them will slow down their laying for a day or two."

"But couldn't we use the other, the living, vaccine? I understand that it only takes one treatment," Mrs. Murphy asked.

"No, not under these circumstances. In

the first place the live virus vaccine will give them a mild case of the disease which will really throw them off production, and secondly, you would be introducing Newcastle onto your farm which is in a neighborhood that is free from the disease and where there is little chance of your flock being infected."

In spite of the promising results from vaccination, caution prevents the conclusion that Newcastle is licked. With further improvements in vaccines, their proper use should help to reduce Newcastle ravages.

In thinking about Newcastle vaccination, it is well to remember an important fact, no disease of animal or man has yet been eradicated by vaccination alone. Vaccination correctly employed, together with a workable large scale sanitary program, may be expected to keep diseases like Newcastle at a low level. Our country's experience has shown that diseases like foot and mouth and fowl pest can be stamped out completely by drastic programs of quarantine of infected premises, slaughter of diseased or exposed animals, and disinfection. In this way all of the causative agent or virus, both inside and outside of diseased and of recovered carrier animals, is killed and none remains to start new outbreaks. But where a disease has become widely established, as had Newcastle in this country before it was definitely identified, such forthright eradication was well nigh impossible. The Australians had shown that strict enforcement of quarantine, slaughter and regulatory measures could keep Newcastle from spreading within the country. In the United States our failure to curb rapid spread of Newcastle may be laid to a general reluctance on the part of the poultry industry to impose any restrictions on normal business or traffic. They were, at least at first, against anything that might interfere, even temporarily, with shows, chick sales, and so on.

One of the essential elements in our fight to control Newcastle is the day to day knowledge of its spread. No individual or group of farmers will gain anything by neglecting to report promptly Newcastle, or what appears to be Newcastle disease, when it shows up in their poultry. In many states the reporting of all contagious disease of both man and animals to the State Livestock Sanitary Office is required by law. Where this law is carefully observed, individual losses are reduced and overall control of infectious diseases becomes far more effective. We

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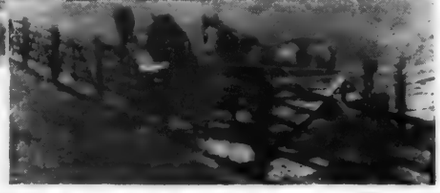

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needn't be told again that vaccination, sanitation, quarantine, plus judicious regulation of traffic in poultry and poultry products are the weapons for a winning long-range program.

To sum up some of the major points:

1. Newcastle disease is a highly contagious and destructive infection of poultry and other birds. It may also attack other animals including man.

2. Newcastle disease is caused by a very resistant virus. This virus may live in the diseased carcasses and droppings for periods of weeks and months.

3. Spread of the disease is by direct and indirect contact with affected birds in the incubative and active stages and with carriers. Recovered birds may carry and spread the virus for at least two months.

4. Immunity to Newcastle disease can be obtained by proper use of killed and living vaccines. The killed vaccine gives a good degree of protection which, however, may be largely lost within two months. This vaccine may be used with safety in young chicks and laying birds and in flocks where lowered vitality precludes use of the living vaccine.

The living vaccine gives a good immunity which lasts longer than that from the killed vaccine. Whether the protection persists as long as that from natural infection has not yet been determined. At best it can be hoped that it will protect for one to several years. The living vaccine introduces active virus onto the premises. Without due precautions virus may spread from vaccinated to unvaccinated birds and flocks. The live virus vaccine must be used with caution to avoid undesirable results in flocks, especially where low vitality due to various causes may be operating.

Chicks hatched from immune hens receive a temporary immunity from the yolk which lasts for about a month. They cannot be vaccinated effectively during this time, but afterwards become as susceptible as chicks from nonimmune dams.

5. Most states require written permission from the livestock sanitary official to bring in the living Newcastle disease vaccine. The object of such control is to reduce the unrestricted and unqualified use and the abuse of the vaccine.

6. Control of Newcastle disease in countries and areas where it is well established requires proper sanitary and regulatory programs together with proper use of available vaccines. With this, the wholehearted interest and cooperation of the poultry industry is essential.

THE AUTHOR

DR. CARL A. BRANDLY was Director of the War Research Program to study Fowl Pest and Newcastle disease which he describes in this article. Dr. Brandly received his Master's and Doctor's degrees from the Kansas State College where he later served for nine years as Assistant Professor of Bacteriology and was in charge of poultry disease investigations. His teaching career took him to the University of Illinois for three years where he was Associate Professor of Veterinary Medicine and, since 1945, he has been Chairman of the Department of Veterinary Science at the University of Wisconsin. Beside his major contributions in the field of poultry diseases, Dr. Brandly has worked on brucellosis in animals and man, diseases of fur-bearing animals, diseases associated with nervous disturbances of dogs, anthrax and hog cholera.

NEW WORK FOR BUCKWHEAT

(Continued from page 57)

fertilized so I fertilized. The buckwheat got as high as my chest. I had more than they could use, so I combined the extra. Got a good yield; better than 40 bushels to the acre. It wasn't the first buckwheat I had grown," Fryman added. "Back home in Kentucky we used to grow about 10 acres every year. We used a lot of it for feed, but also made flour with some of it every year because we liked buckwheat cakes. There was a mill that would take the hulls off for us. It's hard to find a mill that will do that any more." The drug company for which he grew buckwheat stopped making rutin and Fryman hasn't grown buckwheat since. "I can make more money growing corn on this land," he points out, "but, I often wonder why more farmers with fairly poor land don't grow buckwheat."

Where It Is Grown

Buckwheat, unlike wheat, corn, and Brigham Young, did not go West as the country was developed. It is still grown principally in the Northeastern part of the country. It can, however, be grown almost any place north of the cotton belt. In some parts of New York and Pennsylvania buckwheat is a crop of major economic importance. Other states among the leading producers are Minnesota, Michigan, Ohio and West Virginia.

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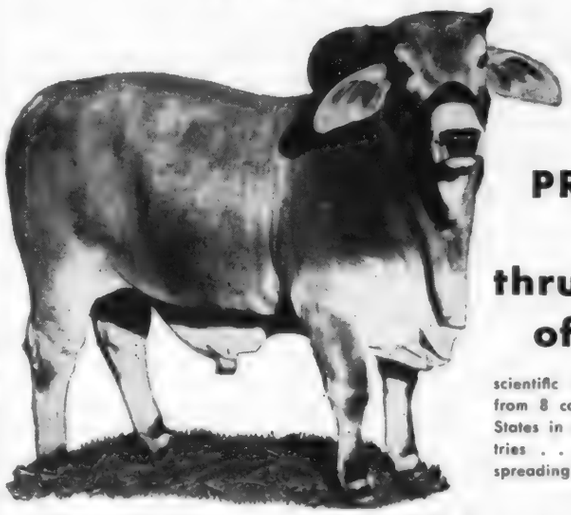

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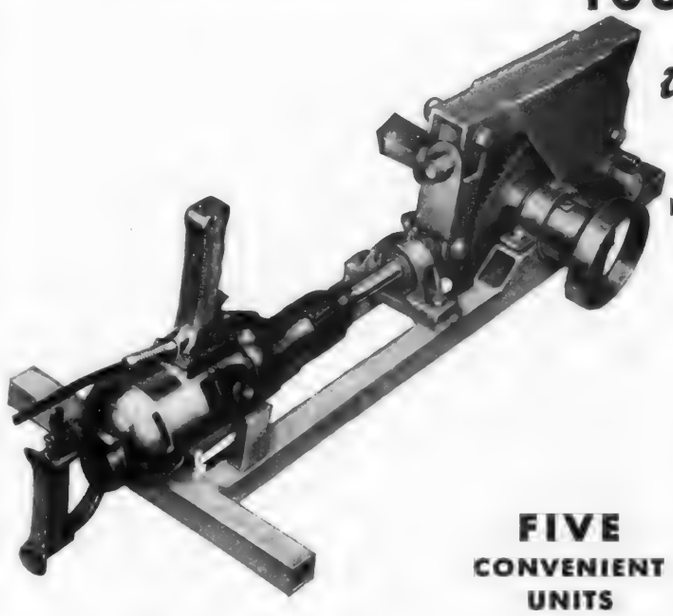

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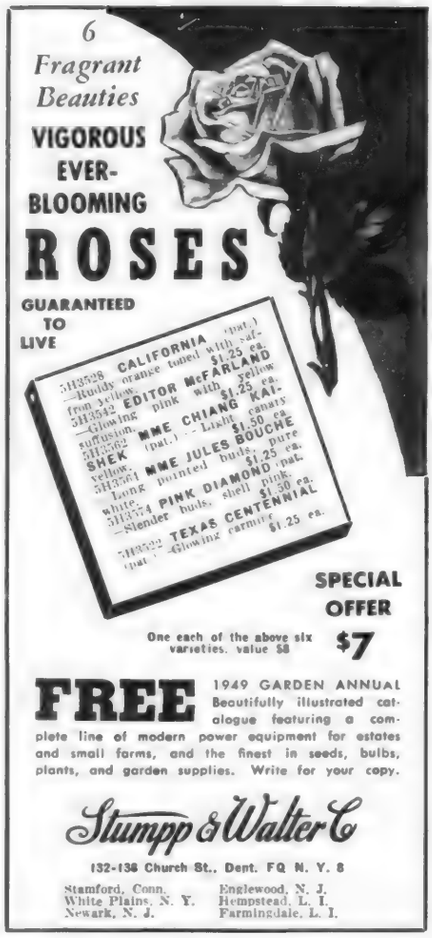
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Buckwheat grows best where the climate is cool and moist. High temperatures and dry weather can cause it considerable damage, especially during the flowering stage, for hot winds cause the flowers to blast. Strong winds and heavy rainfall may cause the plants to lodge or even uproot, for buckwheat has a small root system. Because of these hazards it is best to plant buckwheat so that main stem growth occurs in warm weather and grain forms in the cooler months.

What Soils?

Because buckwheat will grow on fields of low fertility it is sometimes planted on land too poor for other crops and expected to produce a good harvest without benefit of fertilizer. When planted in this manner, the farmer is very likely to reap a combination of low yields and high erosion. Buckwheat's small root system does a poor job of protecting soil from hard rains.

It grows best in light well-drained soils. The fields should be plowed early in the season and kept in shape until seeding by occasional harrowing. Early plowing is especially important where old sods are plowed under or where the field has been lying idle for several years. Experimental work in West Virginia showed that early plowing added an average of 8.6 bushels per acre to the yield. Proper fitting of the land means that the seed can be drilled at a more uniform depth and that the soil will hold enough moisture to encourage rapid sprouting and a more uniform stand.

Where buckwheat must be planted on the same field year after year, the organic material in the soil takes a beating. Buckwheat should be grown in rotation. If it is necessary to grow successive crops of buckwheat on the same field, a catch crop of rye for green manure will help keep the organic content of the soil up and prevent erosion of the top soil.

How To Fertilize

Buckwheat responds to fertilizer with larger yields. The biggest need of buckwheat on most soils is for phosphate. On fairly fertile soils, 200 to 300 pounds of superphosphate per acre will satisfy the plants needs. Superphosphate is the only fertilizer that will consistently improve buckwheat yields. In Pennsylvania experiments, potash applied with the phosphorus gave only a four per cent increase in yield. Adding nitrogen to the soil did not increase the yield and if there is too much nitrogen the stems and leaves may flourish at the expense of the seed crop. Barnyard manure cuts the yield.

Lime requirements for buckwheat are low. Extremely acid land should get 500 to 1000 pounds of lime before it is planted to buckwheat.

Varieties

The four varieties of buckwheat grown

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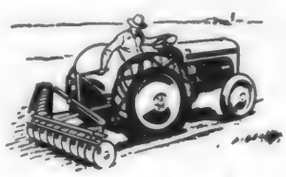

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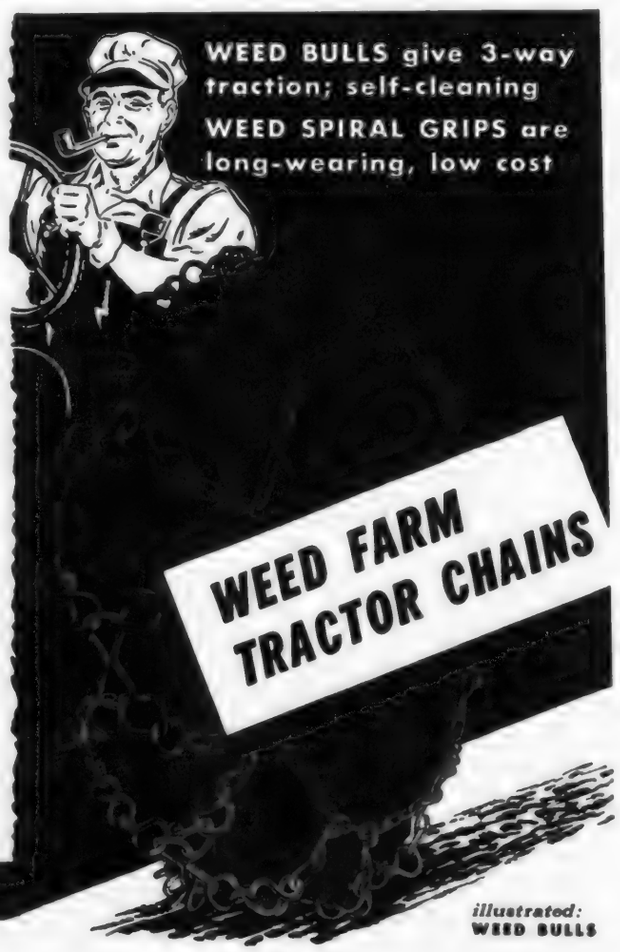

illustrated: WEED BULLS

in this country, are Japanese or Black, Common or Gray, Silverhull, and Tartary.

Japanese or Black: This is the most common buckwheat grown for food and feed and probably the most satisfactory all 'round variety. It has rather large, winged, black seeds. It is less susceptible to wilting than the other varieties.

Silverhull: This is a small seeded variety. The seeds are shiny gray, wingless and somewhat plumper in appearance than the Black.

Common or Gray: Between the Black and Silverhull, in both size and color, is the Common Gray. All three of these varieties cross pollinate, which accounts for the fact that many crops of buckwheat are mixtures of Black and Gray. Some farmers plant Black and Silverhull together as insurance against a bad season. They grow at different rates and flower at different times. If one fails to make a crop, the other might. This is good for the bees, too, for it prolongs the flowering season.

Tartary: Tartary also known as Hillbilly Buckwheat. Rye Buckwheat, and Duckwheat has had a run of popularity recently. It is hardier than the other varieties, sometimes reaching five feet and is more resistant to lodging than other varieties. It branches widely and instead of flowering at the top, as other varieties do, it flowers along the stem at the bases of the leaves. Blooming, seed setting, and ripening are spread over a period of several weeks. The seeds are small, brown and rough, with creases instead of ridges. Millers want nothing to do with Tartary buckwheat and are likely to throw a wingding if they find it mixed with other varieties. Tartary is hard to separate from the hulls and in addition it has a bitter taste that shows up in buckwheat cakes. Tartary is lower in protein and total digestible nutrients than other varieties of buckwheat, although cattle and poultry seem to thrive on it. With all these apparent shortcomings Tartary is still gaining attention from growers and processors, for it is the primary variety used for the extraction of rutin.

Planting Buckwheat

Japanese, Silverhull, and Common buckwheat, or mixtures of the three, should be planted at the rate of three or four pecks per acre. Tartary has a smaller seed and two pecks will cover an acre. When Tartary is grown for rutin, however, it should be seeded three pecks per acre, since it is the leaves and flowers that are harvested instead of the seed.

Throughout the Midwest, buckwheat is seeded in June and the first half of July, or about 10 weeks before the first killing frost. When Tartary is grown for rutin, it can be harvested from 35 to 50 days after sprouting. Farmers in the latitude of Philadelphia often plant three crops in one season, one right after the other. Soil men point out, however, that this is overworking the land.

When the seeds start to ripen the buckwheat farmer keeps a close watch on his fields. He moves the combine or binder into the field when the majority of the seeds are ripe. If he waits too long shattering will cost him money. To cut the shattering losses still further he often cuts early in the morning when fields are damp with dew. If he harvests with the binder the grain is stored in small loose shocks until threshing day. It should be hauled from the fields while still damp with dew.

When the combine is used for harvesting, the date of cutting should be postponed to allow the seed to ripen as much as possible. It threshes out better if the plants are dry and the combine causes only slight loss from shattering.

Special care is needed for harvesting Tartary buckwheat for rutin extraction. Especially important is the time allowed to elapse between cutting and dehydrating. Since this time period should never be longer than a few hours, most rutin buckwheat is grown near the dehydrating plants.

The leading centers for buckwheat growing for the processing of rutin are in the vicinity of Bethlehem and Nazareth in eastern Pennsylvania and near Plainsboro, New Jersey. There are in this area some large drug companies that produce rutin. Farmers near Toledo, Ohio, and Detroit, Michigan, grow rutin buckwheat for the Parke Davis Company. Near Chicago some is grown for

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the Abbott Laboratories. There is also some grown around Van Etten, New York, Boone, North Carolina, and in the Red River Valley of Minnesota.

Buckwheat must be quick-dried if its rutin content is to be saved. The rapid dehydration requires rather elaborate machinery. Ordinary hay dryers will not do the job. The large dehydrating plants employed in rutin extraction cost $25,000 and up. These facts restrict rutin buckwheat growing to its rather limited areas.

Buckwheat and Money

In 1948 the price of milling buckwheat had dropped considerably from what it brought in 1947. Farmers were selling to mills and feed companies for about $2.25 per 100 pounds. This would make the price a little over a dollar a bushel. Thirty bushels per acre is considered a good yield. Subtract from the $30 that the farmer grossed from this theoretical acre $12 to $15 for seed, fertilizer and labor and you know why buckwheat rates low billing as a cash grain crop. It produces the grain but not the cash.

Buckwheat grown for rutin, however, is a different story. It is bought from the farmer by the ton. A good yield would be eight tons to the acre. Double this, since many rutin buckwheat farmers grow two crops a season, and the total yield is 16 tons. Rutin buckwheat brings almost eight dollars a ton. At these prices, providing his production was good, the buckwheat farmer could gross a yearly income of $128 per acre if he had contracts with rutin manufacturers to handle his crop. At present, however, there are still only a few farmers who can find buyers for rutin buckwheat. In most of these cases the buyer came to the farmer first.

Feeding Buckwheat

Buckwheat is a good feed for poultry, and commercial feed houses often mix it into scratch feeds. Because of its high fiber content, it should be fed sparingly to hogs. It should not make up more than 20% of the grain mixture for either hogs or cattle. If fed to hogs at higher rates it may produce soft carcasses. Buckwheat has 64 per cent total digestible nutrients (TDN) compared with 80 for corn.

Buckwheat seldom rates a major place in the farmer's cropping plans. It should, however, be remembered as a crop that can fill the gap when a spring seeded crop fails, for if handled properly, it will yield well and keep the grain bin filled. As scientists continue to delve into the possibilities of the lowly buckwheat plant, they may help it graduate from the long-time role of substitute.

THE AUTHOR

JOHN P. ARNOLD lives on his 50 acre farm in Bucks County, Pennsylvania, with his wife and two young children. He considers the prime farm crop to be numerous offspring, preferably born 10 years old and already in overalls. Arnold has mixed with his farming such diverse jobs as police reporter, editor, and manufacturer of wood products. Lately he has been turning out scientific articles for magazines and admits that his buckwheat article grew out of his interest in rutin. "Credit," he says, "should be given to Dr. Couch of the USDA who learned to extract rutin from buckwheat, and Dr. Griffith of the University of Pennsylvania, who studied its uses as a medicine."

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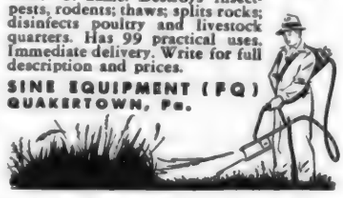

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discovered that if the first cutting in spring is put into a grass silo, it disposes of a good many of the weeds. Often, an unpalatable weed in a pasture may become palatable in a silo."

The West Coast's use of molasses in its canned-grass raises a complex, and as yet unresolved, problem. Again, the situation is something like applesauce. Some like it tart and some like it sweet. Jim Hall of *The American Agriculturist,* who has done much of the editorial leg-work in his paper's rambunctious campaign to popularize canned-grass in the Northeast, told me that, "We emphasized, in our early efforts to get more Northeast dairymen to try grass silage, that a preservative is not necessary to put up palatable, high quality silage . . . provided the grass is about the right moisture content, and that the legumes in it do not exceed 75 per cent of the total.

"However," he admits, "preservatives such as molasses and ground grains do give additional assurance because their sugar content provides more of the acid needed for preservation. The higher the percentage of grass in the mixture, the less need for preservatives . . . but the legumes have more nutritional value. It has been determined that molasses and grains only lose from 9 per cent to 12 per cent of their feed value when used as a preservative. Veterinarians agree that molasses is good for cows in winter. It helps prevent acetonemia. The easiest way to feed it is in silage. I've known farmers to mix as little as five pounds to the ton of silage, and as much as 125 pounds. The average probably is about 30 pounds with the farmers I've talked to. Ground grains are excellent for taking up excessive moisture when wilting is not practiced and, like molasses, allow the farmer to cut down on the amount of grain supplement. Actually, the only cost of using a preservative is, roughly, 10 per cent of the cost of the molasses or grain."

Tillman Bubenzer will tell you, "We have been fortunate in making grass silage without any preservative by cutting the green crops when in full bloom, about 75 per cent moisture, and chopping it in ¾-inch lengths. We tried molasses and cob meal, but didn't like them. Last summer we tried using 30 pounds of whey per ton of grass when we filled two silos for beef. If the cattle eat it as well as the odor of the silage indicates that they might, we'll use whey from now on."

Frank Bauer, an Ohio dairy farmer, is another grass silage convert who has switched to whey preservatives. "It's easier to use than molasses and seems to make a greener silage," Bauer points out, "although when we used molasses for our three silos, we had a trick for applying it that worked pretty well. We mixed the molasses in the tank of the orchard sprayer and ran it to the top of the silo with the pressure from the spraying engine. We took the nozzle off and fastened the spray gun so the molasses would hit the chopped grass as it left the pipe."

Phosphoric acid, molasses, any ground cereal or any green cereal that has advanced to the green-dough stage can be used as a canned-grass preservative. A query to a New Jersey farmer brought back a conviction that "molasses is the only thing to use." The same mail brought a plug from Wisconsin for "dry ground corn and cob meal as a preservative." The USDA scientists at Beltsville stick to their guns and say, "You don't need a preservative." Probably you don't if all the conditions are just right. This often is a hard thing to do on the average farm.

The Massachusetts Agricultural Experiment Station, in a judicial summing up, says, "The inclusion of acids and sugars (in grass silage) modifies the types of fermentation, increases the acidity and tends to reduce the breakdown of protein compounds. Thus the farmer can control pretty well the fermentation process and produce good grass silage under many conditions."

Over-all standards for silage, set up by the American Dairy Science Association's Committee-on-silage-methods, in 1942, are applicable to canned-grass. The standards are:

Very good: Clean, acid odor and taste, no "rancid butter smell" (i.e butyric acid). No slime or moldiness. An acid pH of 3.5 to 4.2, ammonia nitrogen less than 10 per cent of total nitrogen.

Good: Acid odor and taste, with only a trace of the "rancid

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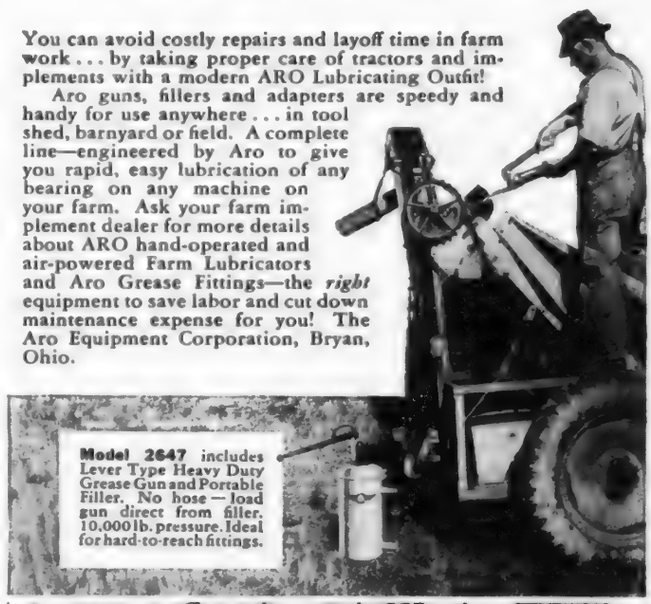

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butter smell", acid pH of 4.2 to 4.5. ammonia hydrogen 10 to 15 per cent of total hydrogen.

Poor: A smell like a run-about truck that has just disturbed a roadside convention of skunks. Presence of slime or mold, acid pH above 4.8, ammonia nitrogen about 20 per cent of total nitrogen.

Grass silage is, naturally, a "technological crop." Machinery and scientific techniques are the things that make it "tick." It would have been an impossible crop on farms 25 years ago. As the 1948 edition of the USDA Yearbook points out (p. 189), "The cost of putting up grass silage will vary with the size of the operation, the efficiency with which machinery is used."

The essential machines are a mower and a windrower or a side-delivery rake, and a chopper. The "blower" isn't essential if trench silos are used, although it is mighty useful in any silo operation. A tractor mower, with windrow attachment, offers one way to cut labor and equipment costs. Many Northeast farmers are turning to field-choppers, which eat up a windrow at man-pace and spew the silage into pacing trucks. "On the basis of a ton of dry matter fed," further reports R. E. Hodgson, "the harvesting and storing operations required 4.3, 4.6, and 4.9 man-hours, respectively, for field cured hay, barn-finished hay, and silage. These differences are small in comparison with the additional feed nutrients saved."

On a dollar-and-cents basis, Roger G. Murphy of the Cornell University staff estimates that the cost of harvesting the equivalent of one ton of field-cured hay as grass silage "would amount to $5.43 with a loader and $5.52 with a field-chopper." Cost of harvesting cured hay by these methods (in upstate New York) were $4.69 per ton with loader and stationary chopper, and $4.37 per ton with a field-chopper.

But, again, these differences in outlay don't tell the story, until the convenience of haying in almost any kind of weather, plus the vast increase in protein content, are added up on the canned-grass side of the ledger.

These benefits are manifest and varied. "If you have a drought in summer," argues Tom Milliman, an official of Grange League Federation (GLF), "you can open up and begin to feed grass silage as early as mid-July. It's in the silo. You start feeding and hold the milk flow to a good level. Then comes fall. You have a choice of refilling the silo with second and third grass-cuttings and legumes . . . or you can put corn right in on top of the grass that's left. A lot of silos on Northeast farms are using grass in the lower half and corn in the top.

"Take the field on which you would otherwise grow corn for ensilage and grow corn for grain. You can still use some of it to refill the silo and put the balance in the corn-crib. Ear corn will cut the feed bill considerably. Paying the feed bills from the milk check and taking care of the labor,

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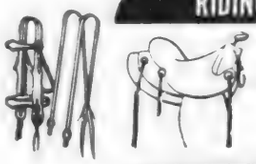

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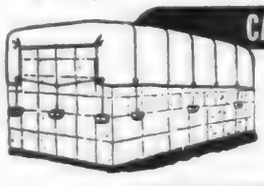

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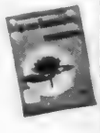

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machine repairs, wheat fertilizer, some new roofs, gasoline and oil, out of the same check, just about exhausted it. But once we got the silo and corn-crib filled, then the combination of ear corn and home grown oats, ground and mixed together with some supplemental ration, put me financially ahead for the whole winter."

Ensiling grass will, to some extent, lessen the need for growing sudan grass for summer grazing. Early cut fields, cut or grazed again, will yield more next year. "Most grasses," and these are Federal instructions from Beltsville, again, "should be cut after the heads have emerged but before the plants have started to bloom. Alfalfa should be cut at an early bloom stage (one-tenth to one-fourth in bloom). Most clovers should be cut when they have reached half to full bloom, but before the blossoms have turned brown. Soybeans, lespedeza, and cowpeas should be cut soon after the first seed pods have filled. Cereal crops like oats, wheat and barley may be cut any time from a pre-bloom to a milk or early dough stage, depending on the relative importance of a high protein and carotene content compared with a high total silage yield. Where mixtures of grasses and legumes are ensiled, the crop should be cut at a stage best suited to the kind of crop that predominates in the mixture."

The pay-off in grass ensilage is how livestock responds to it. To date, the crop has been used largely with dairy herds, where farmers are finding that they can save at least one bag of grain ration per cow per year. (There are 26,000,000 dairy cows in the U.S.A. So, with feed averaging $4.00 a bag, there's a potential saving of $104,000,000 a year in prospect.)

Use of grass silage for hogs and beef cattle is still very much in the experimental stage. Yet, again, I found some excited converts. Ed Babcock reports that "growing fattening pigs will leave grain to eat a few pounds of silage daily . . . We've maintained brood sows all winter on good grass silage." Out in Iowa, some feeders have been giving brome-alfalfa ensilage to hogs for the past five years. They report it the equivalent of "good pasture." In February, their fall gilts and barrows consume about two pounds per head per day. They also use molasses as a preservative, on a ratio of 12 barrels, with an equal amount of water, for a 12 x 40 foot silo.

As for beef cattle, those who have fed it "confidently predict" that grass silage will become the principle beef cattle feed in the United States when stock has to be fed forage during the winter, dormant seasons or drought periods.

Back in dairying, where the bulk of grass silage data has been accumulated, USDA experiments proved conclusively that grass silage fed with corn silage and grain produce more milk, more gain in liveweight and produce 100 pounds of milk at lower feed requirements than when field-cured or barn-cured hay is used.

Specifically, these tests showed that milk production rose an average of one pound per cow per day when wilted silage replaced field-cured hay in the ration. Similarly, cows averaged ten pounds more liveweight with grass silage than with field-cured hay, although they consumed 63 pounds of digestible nutrients per 100 pounds of 4 per cent milk as against a 65.7 pound total with field-hay ration. In short, by making the hay crop into silage, 12.5 per cent more milk per acre was obtained than when the same crop was field-cured. In 1947, when field-cured hay was badly damaged by rain, grass silage accounted for 40 per cent more milk per acre.

Whether the current campaign of the soil conservationists to put back big chunks of the prairie country into clover and cover crops "on rotation" ever brings grass silage into the beef cattle or even the hog-feeding picture is a matter that only continued experimentation can determine. Certainly, the data accumulated to date makes it seem logical.

Meanwhile, scores of new canned-grass experiments are being planned for the 1949 growing season. Bigger and better trench silos . . . grass that isn't even chopped . . . direct mixes of doughstage grain and legumes ensiled into a "one-shot" formula

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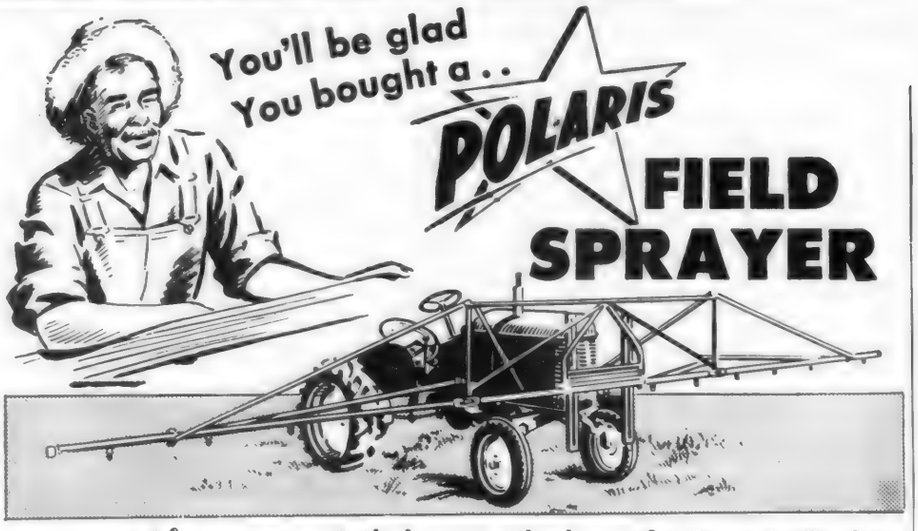

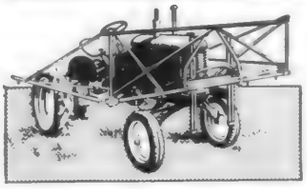

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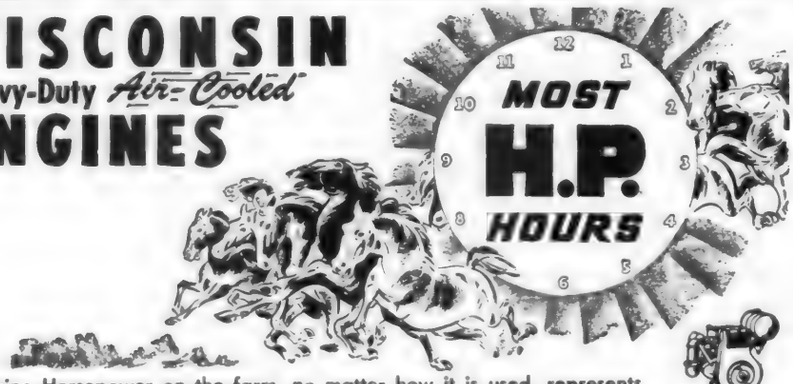

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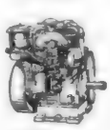
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THE AUTHOR

ROBERT WEST HOWARD keeps his finger on the pulse of American agriculture. He knows farmers and their problems and how to interpret new developments in terms of what they mean to the farmer. He started his literary career at the age of 16 as a copy boy on a New York paper. Since then he has held a variety of editorial and writing jobs including posts as Associate Editor of *Farm Journal* and Editor in Chief of *Pathfinder*. "Canned Grass" is his first *Farm Quarterly* article, but probably not his last. Howard is married, has two children, and lives in New York, when not traveling around the country on the trail of a story.

COW DOG

(Continued from page 55)

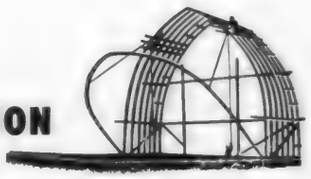
mornings now are a blank wall of mist. I can be lazy now. I stand by the gate, and give her the command, "Go get 'em." Off she streaks, her keen ears and sharp sense of smell sending her without hesitation in the right direction. I hear her working; her bark has a strange hollow sound in the fog as she starts the cows moving, and presently I see them looming out of the mist, lumbering along faster than I would like, for June is a young dog still, and, away from my restraining voice, tends to work too fast. But she will learn, and the passing of the years will slow her down.

A Dog's Life

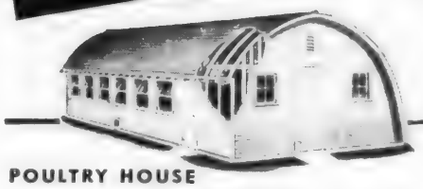
And June is doing all right, too. A dog's life, it seems to me, has a very good chance of being a happy life. To be sure, most dogs find their every-day life and their amusements somewhat cribbed and confined by restricting laws from above, but who among mankind has not found the same? With any luck at all, a dog has security for food and shelter, he has some opportunity for exercise, some chance of diversion, and a few dogs are fortunate enough to have a definite job of work to do. This is about as much as most men can expect of life. But what is more important, dogs, alone among animal kind, have found their god. He can smell his god, and see him, and hear him, and feel him. It must be something to have a god that will give you a good solid hug once in a while. A dog knows what he lives by.

THE AUTHOR

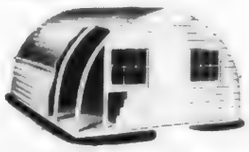
ELIZABETH NICHOLDS and June, the cow dog, live on a farm in up-state New York which Mrs. Nicholds operates, with June's help, and, in addition, works as a milk tester for the dairy farmers in her neighborhood. This is her second article for the *Farm Quarterly;* her first was, "Here Comes the Tester," published in the Summer 1948 issue. June, incidentally, has given birth to a litter of black and white puppies since this article was written.

STRENGTH from FOUNDATION  to RIDGE

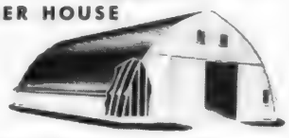
with RILCO *Laminated* RAFTERS



POULTRY HOUSE



BROODER HOUSE



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Saving Wood

(Continued from page 83)

the oil exerts additional pressure and forces more solution into the lower half of the post. The butts of the posts, being underground, are most susceptible to decay and termite attack and should receive heaviest treatment.

A vertical treating tank may be made by welding two or three old oil drums together. A used gasoline storage drum (3 by 8 feet, 500 gal. size) can be converted to a treating tank by cutting out one end. The tank should be large enough for several posts and tight enough to hold an oil solution. Test the tank for leaks before you use it, for although it is tight enough to hold water, it still may not hold oil. To make it easier to put the posts in the tank, it's a good idea to set the bottom of the tank in the ground. The top of the tank should be about knee height.

If you want to treat longer posts or lumber you should use a horizontal tank, a steel stock tank will work. Don't fail to clean it carefully, however, before you reuse it for watering livestock. The wasted space at the round ends of the tank can be filled with rocks to reduce the amount of solution required for the treatment.

Fasten the posts down

Treat posts of the same species in one tank load. Don't mix different types, sizes or cuttings of wood that require different lengths of treating time. The table shown

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on the bottom of this page will give the approximate time for various kinds of posts.

Load your tank efficiently. If you are using round posts, fit them in closely to each other. If you are treating lumber, use 1" x 1" pieces as separators so that all surfaces will be exposed to the solution. To fasten the posts down tightly you will need pressure bars fastened on to a round drum head, like that shown on page 82, for a vertical tank, and a similar arrangement for a horizontal tank. After posts are tied down you are ready to add the preservative solution. Bring it up over the top of all the posts in the tank.

Soak them good

A ready-to-use solution of Penta or Penta concentrate which is recommended for various posts' treatment by your county agent or state forester will come in various size drums—the 55 gallon size, of course, is the most economical. Be sure the label of your solution indicates the oil contains 5% Pentachlorophenol dissolved in it, or if it is a concentrated solution thin it down to a 5% solution. Don't get your hands in the Penta solution. If they get into it wash them off with soap and water. The best way to handle the freshly treated posts is with industrial rubber gloves. Add the Penta solution to the tank often enough to keep the level over the top of the posts so you will replace the amount soaked up by the wood. Keep the tank covered so rain water doesn't get in it. The posts should be soaked for the recommended length of time for the species of wood. A shorter soaking period may result in a poorly treated post and a shorter service life. If you want to paint your posts be sure to buy a Penta solution that is recommended as "paintable." The oils used for paintable solution will need to dry for a minimum of eight months after treatment before painting if you use the regular fence post oil solutions. If the post is not going to be painted, it is better to use the cheaper, heavier, darker oils. The table below gives suggested treating time for different species.

TREATING PERIODS FOR DRY, WELL SEASONED POSTS

Ash, black—Soak 72* hours
Beech—Soak 48 hours and incise 12" above and below ground line
Birch—Soak 48 hours and incise 12" above and below ground line
Cedar—Soak 72* hours
Chestnut—Soak 72* hours
Cottonwood—Soak 48 hours and incise 12" above and below ground line
Cypress—Soak 72* hours
Elm, white—Soak 48 hours
Hackberry—Soak 48 hours
Locust, black—Soak 72* hours
Locust, honey—Soak 72* hours
Maple, hard—Soak 48 hours and incise 12" above and below ground line
Oak, white—Soak 48 hours and incise 12" above and below ground line
Oak, red—Soak 48 hours
Osage orange—Soak 72* hours
Pine, jack—Soak 48 hours; if very dry 24 hours may be sufficient
Pine, southern yellow—Soak 48 hours; if very dry 24 hours may be sufficient
Pine, southern yellow, dense—Soak 48 hours; if very dry 24 hours may be sufficient
Pine, western white—Soak 48 hours; if very dry 24 hours may be sufficient
Poplar, yellow—Soak 48 hours and incise 12" above and below ground line
Redwood—Soak 48 hours
Walnut, black—Soak 72* hours
Willow—Soak 48 hours and incise 12" above and below ground line

*Incising 12" above and below ground line will improve treatment.

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Drying the posts

After the posts have soaked for the required length of time they should be removed and the excess solution drained off in some kind of a trough. These drippings are valuable and can be returned to the rest of the solution. Then stack the posts in the same manner as was used for seasoning and let them dry for a week or so. If you notch your corner posts, be sure to apply a Penta solution to these exposed spots. Whenever it's possible, it is best to do the notching before treating.

How Much Does It Cost?

The cost of treatment will vary with the kind and diameter of the wood you use. In general though, a post 3½" in diameter and 7 feet long takes ½ gallon of 5% Penta solution to thoroughly treat it against decay and termites. Charles Walters, of the University of Illinois Forest Research Station, who has worked for several years on the use of preservatives for farm lumber gives these figures, "A Penta concentrate solution will cost you in the neighborhood of $2 per gallon. If you use a concentrate which requires a 1 to 4 dilution, mixing one gallon of concentrate with four gallons of diesel fuel oil at 15c a gallon, the cost of the 5% preservative solution becomes 48c a gallon. Using ½ gallon of this solution per post would make the preservative cost 24c per post. The labor and equipment costs will vary depending upon your efficiency, but most farmers can figure that their total cost to treat a post is going to be something around 30c. If you can double or triple the life of your posts, however, this should be one of the best investments you can make in eliminating future fencing costs."

How Long Should Treated Posts Last?

In the publication put out by the Wisconsin Extension Forester, R. W. Abbott called "Longer Life for Wisconsin Fence Posts," the following table is given indicating the life of various types of posts, with treatment and without it, in that state.

Expected Life for Fence Posts

Wood	Years Expected Life Without Treatment	Years Expected Life After Treatment
Aspen (popple) (round only)	2-3	15-20
Basswood (round only)	2-3	15-20
Birch, river, yellow (round only)	2-4	15-20
Birch, white (round only)	2-3	10
Cedar, red (round or split)	15-20	20-25
Cedar, white (round or split)	15	20
Elm (round only)	4	15
Hickory (round only)	5	15
Locust, black	15-25	30-40
Maple, hard, soft (round only)	2-4	15-20
Oak, red, black (round only)	5	15
Oak, white, bur (round or split)	10	15-20
Pine, white, red, jack (round only)	3-5	15-20
Tamarack (round only)	7-10	15-20
Willow (round only)	2-3	15-20

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Oldtimers will say that you should cut fence posts only when the moon is on the wane. If you do, the posts will never crack from top to bottom. There's also the belief that if you set black locust posts, your fence worries are over. Bob Craig, who was busy this spring resetting a fence line on a farm near Cannelton, Indiana, had this to say. "The four-inch black locust posts along our fence lines were cut, peeled, and dried in the right sign of the moon. We played safe, and used good quality posts. Right now I am having to take time out when I should be getting oats planted, to replace many of the posts. They have been in the ground just 11 years. You'll see that our new black locust posts have been treated."

To treat or not to treat wood for farm use is a question that a farmer will eye carefully before spending his scarce time. But today the price of lumber and labor will be strong arguments in favor of taking the time now rather than later.

FERTILIZER

(Continued from page 34)

Calcium is the bell-cow of the secondary plant foods. There's plenty of it available in various limestones, oyster shells, phosphate rock, superphosphate and gypsum. It boosts early root formation and growth; improves general vigor and stiffness of straw; influences intake of other plant foods; neutralizes poisons produced in the plant; encourages grain and seed production: increases calcium content of food and feed crops: and stimulates the growth of soil bacteria.

Magnesium is found in dolomitic limestone, magnesium sulfate, sulfate of potash-magnesia and magnesium oxide. It aids in maintaining dark green color of leaves; regulates uptake of other plant foods; acts as carrier of phosphoric acid in the plant; promotes the formation of oils and fats; and plays a part in the translocation of starch.

Jim believes the fertilizer makers should use a good carrier and give its name on the label. "A fertilizer which uses dolomite as a carrier," he said, "supplies an important amount of magnesium and calcium as soil sweetners and plant foods in addition to the guaranteed formula."

The chief sources of sulfur for crop use are natural sulfur and sulfur obtained from fertilizer materials such as gypsum, ordinary superphosphate, sulfate of ammonia and sulfate of potash. Considerable sulfur liberated into the atmosphere in the burning of coal is returned to the soil in rain water. It gives increased root growth; helps maintain dark green color; promotes nodule formation on legumes; stimulates seed production; and encourages more vigorous plant growth.

The minor plant food elements, also called "trace elements," are boron, manganese, copper, zinc and iron. Although

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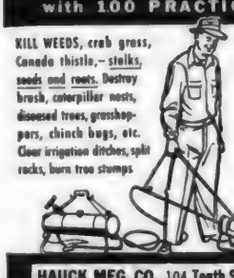

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relatively small quantities are required, all are necessary for plant growth. "What we don't know about minor elements would fill a library," Jim said. "but we do know that poor plant growth is sometimes caused by the lack of one or more of the minor elements. This is particularly true when large amounts of the major elements are used. The more yields are boosted the more of the minor elements are taken out of the soil.

Lack of boron, for example, may cut yields of alfalfa and other crops. Deficiencies of these minor elements in soils are not so widespread as to warrant their general addition to all fertilizers. When deficiencies do exist in soils, they can be conveniently corrected by the addition of these elements to commercial fertilizers. The state experiment station or the county agent should know what is lacking in your area.

In some cases, minor elements also are used to good advantage as separate materials applied to the soil and as a spray applied to the growing crop. "They're like drugs," Jim explained, "a tiny amount of strychnine will stimulate the heart; twice the amount will stop it."

With some of these elements the range between beneficial and detrimental amounts is very narrow so they must be carefully used, for too much will cause injury.

Such other elements as sodium, chlorine and molybdenum affect plant growth and are now regarded as essential plant foods. This is essentially true for sodium which on some crops and under some conditions seems to serve a specific function of its own in promoting plant growth. This is true of sugar beets. On other crops and under certain conditions it has the ability to substitute for a portion of the potash requirements. As a rule, the higher the analysis of a fertilizer the less likely it is to contain sufficient amounts of the minor elements.

Manure

More than one billion tons of manure are provided by the farm animals of the United States every year. Because most farmers are careless with handling and storing they get only about half value out of it. Losses vary widely from farm to farm and from region to region. (See *Farm Quarterly*, Winter 1948.) American farmers are notoriously lax in handling manure.

Animal manures are poorly balanced in their plant food content. They're high in nitrogen and potash but low in phosphoric acid. The addition of superphosphate to manure not only improves plant food balance but helps to save nitrogen and aids in barn sanitation.

Manure is a triple threat player: (1) Organic Matter — Manure supplies valuable organic matter to the soil and organic matter improves soil tilth, increases water-holding capacity, improves aeration, regulates soil temperature and has a beneficial effect on soil micro-organisms. (2) Plant Food — A ton of fresh manure contains about 10 pounds of nitrogen, 5 pounds of phosphoric acid (P_2O_5) and 10 pounds of potash (K_2O) and small quantities of other plant food elements such as manganese. Nearly half of the plant food value of manure is in the liquid portion. (3) Growth-Promoting Substances — Organic hormones in manure are helpful in promoting and stimulating plant growth.

Proper handling improves the value of manure. Here are the recommendations: Use enough bedding to absorb the liquid. It's the best part of manure. Spread as quickly as possible after it is produced and work it into the soil. Store in a covered building or shed and compact it so that air is excluded. Add superphosphate to save nitrogen and balance its plant food content. Adding 2 to 2½ pounds of superphosphate per day (50 to 100 pounds per ton of manure) for each horse, cow or steer is a recommended practice; also add 100 pounds per ton of fresh poultry manure.

The composition of various manures is shown below. The composition varies widely under different conditions and methods of handling.

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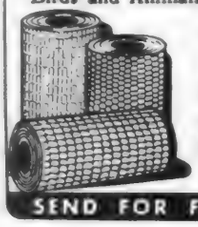

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(Includes solid, liquid and bedding)

Kind of Animal	Nitrogen (N) Pounds	Phosphoric Acid (P_2O_5) Pounds	Potash (K_2O) Pounds	Tons Manure Produced per Year per 1000 Lbs. Live Wt.
Horse	13.2	5.1	12.1	12
Cow	11.4	3.1	9.9	15
Pig	9.9	6.7	9.3	18¼
Sheep	15.8	6.7	18.0	9¾
Steer	15.0	6.0	8.0	9
Hen	21.0	16.4	10.2	4½
Duck	11.4	28.8	9.8	

Source: Cornell University

What's In Your Fertilizer?

All mixed fertilizers and fertilizer materials have a guaranteed analysis showing nitrogen, phosphoric acid and potash content which is stated either on the bag or tag as required by state laws.

The guaranteed analysis is simply a convenient method of expressing in percentages the content of certain plant foods. Thus a 5-10-5 grade of fertilizer would be guaranteed to contain 5 per cent nitrogen, 10 per cent available phosphoric acid and 5 per cent soluble potash, which adds up to 20 pounds of guaranteed plant food per 100 pounds.

The question naturally arises as to what makes up the remaining 80 pounds in 100 pounds of a 5-10-5 fertilizer and why the 20 pounds of guaranteed plant food cannot be bought separately.

Those unfamiliar with the composition of fertilizer often consider the plant food content only in terms of the three most common guarantees—nitrogen, phosphoric acid and potash. However, most mixed fertilizers containing from 20 to 30 per cent of these three major plant foods carry additional secondary and minor elements as part of the compounds of the "Big Three" and as carriers.

It is now known that these secondary and minor elements—calcium, magnesium, sulfur, boron, copper, manganese, iron and zinc—are essential plant foods which are deficient in many soils. If these plant foods are not found in adequate quantities in materials commonly used in the manufacture of fertilizers, they must be added as separate materials. Boron, for example, is supplied by adding borax, and substantial amounts of calcium and sulfur are supplied in ordinary 20 per cent superphosphate.

Materials that supply secondary or minor plant foods are valuable parts of a good fertilizer and should not always be classed as inert filler, depending on what the filler happens to be. For example, when dolomitic limestone is used to make fertilizers neutral or non-acid forming and to supply additional quantities of calcium and magnesium, the efficiency of the fertilizer is increased and value is added. The same is true for many conditioning agents used to make fertilizer distribute evenly and flow freely in the drill.

Scientists Say:—

Never Plant Legumes Without Inoculation

To assure maximum crop vigor and fertility restoring power, experts universally recommend inoculation of clover, alfalfa, lespedeza, peas, beans, vetch, lupines and all other legume seedings. Inoculation costs only a few cents an acre with

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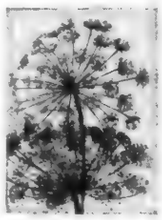

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IRVINGTON, N. Y. DES PLAINES, ILL.

Money can be saved by buying high analysis fertilizers because more pounds of plant food are contained in each bag. Pounds of plant food—not tons of fertilizer—count on the farm.

Higher Analysis Fertilizers

In the early days mixed fertilizers were made from industrial by-products, waste materials, low grade superphosphate and materials from natural mineral deposits. Such materials usually were low in nitrogen, phosphoric acid and potash and so were the mixtures made from them.

Since these early days much progress has been made in developing new fertilizer materials and in concentrating old ones. Using more concentrated materials, the average nitrogen, phosphoric acid and potash content per 100 pounds of mixed fertilizers has been increased from 13.9 in 1920 to about 21.7 in 1946, or almost doubled. The trend is toward still higher concentrations.

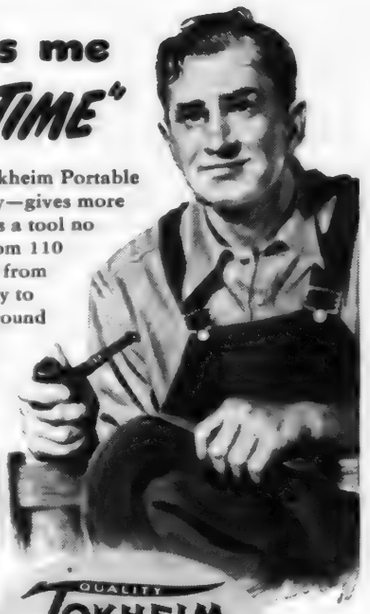
Low analysis fertilizers cost less per ton but more per pound of plant food. This is true because it costs less per ton for storing, handling, bagging and shipping fertilizers containing 25, 35 or more units of nitrogen, phosphoric acid and potash than it does for grades carrying less of these plant foods. Of course the total cost of the raw material in a high analysis fertilizer is greater and the cost per ton is higher but the cost per pound of nitrogen, phosphoric acid and potash delivered on the farm is less. At current prices plant nutrients in high analysis fertilizers cost about a cent less per pound than that in the low analysis grades.

How much nitrogen, phosphoric acid and potash a mixed fertilizer should carry varies with different sections of the country due to differences in soils, crops and climate conditions — and people. Customs and habits play an important part in determining fertilizer use. It's easy for a farmer to get into a rut. They have been slow to take up "new" mixtures as replacements for "old" mixtures that have been used with good results over a period of years. When the new mixtures cost considerably more per ton that slows them down some more. Too much fertilizer is sold on price rather than quality. Also, many of the older fertilizer distributing machines could not be adjusted at the desired rates per acre.

The trend is toward increases in the percentages of nitrogen, potash and phosphoric acid. These new high analysis fertilizers will contain less of the minor and secondary elements, but they will do a specialized job and there will be less bulk to handle. Farmers will have to learn new lessons in applying them, for they differ from the low analysis fertilizers not only in content, but in their effects on soil and crops. The secondary and minor elements should be supplied separately.

Extensive research has determined the grades of fertilizer best adapted to your particular soil and crop conditions. Your

"Air Power gives me MORE LEISURE TIME"



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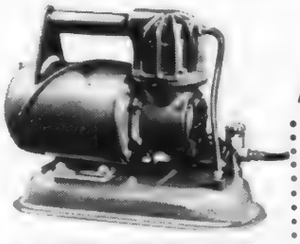

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Farm Equipment Since 1888
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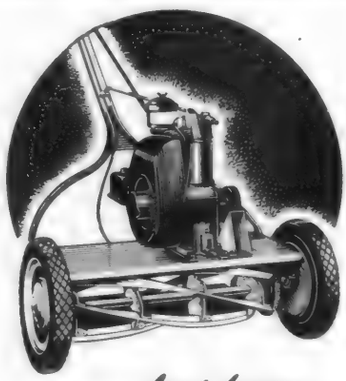
Pioneer and leader in irrigation for nearly half a century



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fertilizer dealer, county agent, or state experiment station should know what you need.

In many areas fertilizers are the farmers' first line of defense against low-yield, low-quality, high-cost crop production. The per acre costs for planting, cultivating and marketing are virtually the same for crops grown on both good and poor soils, yet the difference between profit and loss may depend upon adequate supplies of the right kinds of plant food.

Soils vary widely in their natural supplies of available plant food and many crops have different plant food requirements. Therefore, many different fertilizer recommendations are made because experience has shown that no one grade or analysis of fertilizer is suitable for all crop or soil conditions.

For the most efficient and profitable use of fertilizers:

1. Follow the fertilizer recommendations of your state agricultural experiment station.

2. Remember that fertilizers are used to supplement the natural plant nutrients supply in the soil and those obtained from farm manure and crop residues.

3. Consider the requirements of the rotation as a whole, as well as the fertilizer needs of the particular crop.

4. Remember that fertilizers do not take the place of lime, organic matter, good seed, proper cultivation or good crop rotation.

5. The most efficient results from fertilization come when soil is in good tilth.

6. Select an analysis containing the plant foods which your soil will not supply in adequate quantities for the crop that is to be grown. This requires a soil analysis on your farm.

7. Use adequate quantities, apply at the right time, and use an approved method of application.

"That just about covers the subject," Jim remarked as the sun came out and the clouds began to roll away toward the horizon. "You might want to know what you get back out of your fertilizer dollar. Here's something to remember when you are planning your buying: At prevailing yields and rates of fertilizer application on average soils in the Midwest, one ton of 20-unit fertilizer will add about 160 bushels of corn, 100 bushels of wheat, and 4½ tons of hay or grazing equivalent."

Ed. Note: The *Farm Quarterly* is indebted to Dr. George N. Hoffer of Lafayette, Indiana, and to "Our Land and Its Care," a publication of the American Plant Food Council, Inc., for much of the data in this article.

Now would you gentlemen help me drag her up to the barn, or are you afraid of getting rabbit fever.

Follow the trend—switch to *Corriedale Sheep*

Congratulations to: DICK T. BROWN, OLATHE, COLORADO on receiving the 1948 NATIONAL 4-H ACHIEVEMENT AWARD and to CARRIEDALE SHEEP . . . . whose performance permitted Dick to surpass the record of any other boy in the Nation with any other breed of livestock or any and all crops.

CORRIEDALES not only won Dick, *The National 4-H Club Championship*, the President Truman Silver Service and a $200 scholarship but they are sending him to college at Colorado A. & M. College, Fort Collins, Colorado.

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Early bearing at 2 to 3 years of age (up to 6 years sooner than standard-sized trees); easier to prune, spray or pick; no expensive power equipment; greatly reduced maintenance costs.

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The What, When, Where & How to in the Planting & Care of Dwarf & Trained Fruit Trees

HENRY LEUTHARDT
Port Chester · New York
King Street opp. Comly Avenue

HOW TO DIG A POST HOLE

(Continued from page 37)

tles and an occasional snatch of song. He was singing "I Was Seeing Nellie Home" while I was watching him and managed to get through the whole song by the time the hole was finished.

When he strikes a root or a rock he does not waste time trying to get it out with the digger. He lays it aside and attacks it vigorously with the bar. He never puts a rock back in the hole when he makes the fill. Says the post always loosens up if you do that; the dirt washes away from the rock, which won't settle along with the dirt.

I asked him how he knew when the hole was deep enough and he pointed with pride to a row of numbers in red paint on one of the handles of the digger.

"I measure the post and find out how much will go in the hole," he explained. "When the hole gets down to the right mark on the digger handle I stop and clean her out and put in the post.

"Some fellers guess, but I don't," he said. "I don't take out one smidgen more than I have to."

The size of the post determines the size of the hole. Mr. Tripett makes it a little larger than the post so that his tamper has free play all the way to the bottom. If it so happens that he has made a miscalculation on a bump or a curve in the post, and it won't drop to the bottom neatly, he sets it in and whips it around, forcing it against the sides to enlarge the hole.

When he has set the post squarely in the center of the hole he begins his fill. He holds it there with one hand and uses the toe of his boot to push the first three or four inches of dirt into the hole, packing it down with the tamper. When the post will stand on its own feet, so to speak, he backs off and squints down the line to get it straight. He claims his eye is as good as any plumb bob and disdains its use. After several tries the set of the post satisfies him and he begins to fill up the hole. This he says is the most important part of the job. If it isn't done right the post will not be well anchored and will loosen in time. He throws in a few shovelfuls of dirt, tamps it vigorously, throws in two or three more, and so on to the top.

He manages to get almost all the dirt back in the hole, a feat that somehow seems to defy one of the first laws of physics. He mounds the small excess around the base of the post and then cuts up the sod, placing it neatly on top by hand, and then firms it by lusty smacks with the flat of his shovel.

When he has finished a post he replenishes his chew of plug and goes on to the next with the air of a Rembrant who has just finished a portrait and knows that it is good.

They Never Fail to Deliver

When rains fail, crops fail. A Gorman-Rupp Irrigation Pump assures WATER WHEN NEEDED with least fuel expenditure.

Gorman-Rupp pumps run day after day, entirely trouble-free.

Available in various sizes—ratings from 100 GPM at 70 lbs. pressure to 1100 GPM at 130 lbs. or 3000 GPM at 20 lbs.* They will give the best performance for the least cost of installation, operation and maintenance. A dependable pump.

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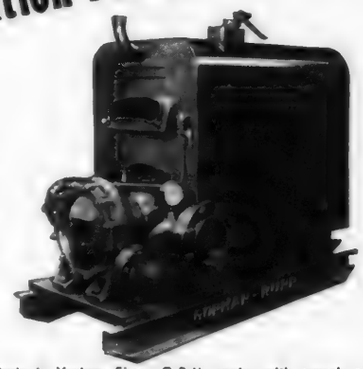

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Made in Various Sizes. G.P.M. varies with pounds pressure, continuous operation ranges follow. (Maximum performance approximately 15% greater.)

Model	HP	Capacity-Pressure Range
6201	7	80 gpm @ 75 lbs. — 150 gpm @ 40 lbs.
5306	11	150 " @ 65 " — 300 " @ 35 "
5303	20	225 " @ 85 " — 400 " @ 40 "
5410	40	300 " @ 75 " — 600 " @ 30 "
5404	30	550 " @ 120 " — 775 " @ 75 "
5503	75	625 " @ 120 " —1250 " @ 60 "
5507	90	800 " @ 120 " —1400 " @ 60 "
5" Fig. 701	125	1100 " @ 130 " —1400 " @ 110 "
*61001	40	1200 " @ 55 ft. —3000 " @ 35 ft.

*Low pressure, big capacity for open ditch irrigation.

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THE GRAND PRAIRIE

(Continued from page 29)

ting good intentions to work. The absentee landlord, some think, is responsible for the bad farm practices. He seldom sees the land; his first interest is the check for the crops. According to an old saying in the region, the first generation on the land went to work, the second generation went to college, and the third went to town.

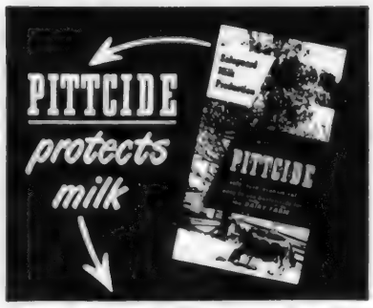
Some of the original or early owners never lived on the land. They bought great tracts that were tenant farmed almost from the breaking of the sod. Hiram Sibley came from England to buy 21 square miles of Ford County land in 1875. Neither he nor any of his family have ever lived on the land. Fourteen thousand acres are still owned by the family. Shortly after the Civil War, a Springfield, Ohio, banker named Foos bought nearly 4,000 acres of Champaign County land from the Federal Government at $1.25 an acre. Most of the land, which has always been tenant farmed, is still owned by the family, who live in the city a thousand miles away. Unlike some other big land holdings which have dwindled in size as the fertility has been trucked off to market and never replaced, the Sibley and Foos estates have been so well managed that the soil fertility has been maintained through the years.

Until automobiles, good roads, tractors, and electricity arrived, life on the Prairie was hard. The early settlers were met by "sloughgrass, frogponds, and greenhead flies," according to Guy Walker. Lowell Hissong's mother remembers when Prairie farmers and their families seldom went to town from early December to mid-April. "The roads were so rough you couldn't sit in the buggy," she says. Often a team would break a double-tree trying to pull a wagon or buggy through the mud. Lowell's wife, as a girl, stayed in town to go to high school because the four miles between her home and school were impassable through much of the winter.

Before days of the tractor and the truck, Prairie farming meant daylight to dark in the field for the farm worker. Cultivating corn was an almost continuous summer job. It began as soon as the corn pushed out of the ground and lasted through hot, humid weeks until the plants were too tall to be cultivated. By the time the last row of a big field was finished, the first was ready for another trip of the cultivator.

"Fifty-five acres was about all I cared to handle when we had horses," Hissong says. "Now that we have tractors, 150 acres don't mean too much."

Because of the rough and muddy roads, hauling the corn to the nearest elevator was to the farmers farthest away a more arduous and time-consuming task than growing or harvesting the crop. For some of them it lasted through most of the winter.



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Isolated on the farm for many months of each year, without domestic equipment that would make country living easy, most women of any of the first three generations on the land were more than willing to leave the farm as soon as enough money had been accumulated to buy a place in town.

Not only was life hard for the people on the Prairie. To many of them it was unbeautiful. Those who had known the hilly country of Pennsylvania, Ohio, and other states found a deadly monotony in the almost level land and the vast stretches of cornfields.

Ross Hissong, father of Lowell, coming from Pennsylvania at sixteen, nearly seventy years ago, saw fertility in the Prairie. But he had no liking for the sloughgrass, frogponds, and greenhead flies.

"If he'd had the money for a return ticket, he'd have gone back, he was so homesick," his widow declares.

The spacious, comfortable farm houses of Ohio and Indiana have no counterpart on the Grand Prairie. If a farmer makes enough money to put up a fine house, he usually builds it in town. And few are the wealthy city men who choose the broad Prairie as sites for their homes.

The typical Prairie home is a severe, boxlike, structure put up by the local carpenter. Modern conveniences of living have been slow in coming to these homes. They have been slowest in coming to the homes of tenants. In 1945, 92 of every 100 farms in the area had at least one automobile, and 87 of 100 were within two-tenths mile of an all-weather road. But 2,128 were still a mile or more from such a road.

In 1945, 91 of 100 farms had radios; 69 of 100 had telephones. In 1945, running water in the house was found on fewer than 15,000 of the more than 40,000 farms on the Prairie.

Although education came to the Prairie with the first settlers, in importance it has often trailed corn and taxes. The one-teacher school early set the pedagogical pattern. As late as 1945, almost a third of all elementary and secondary school children in six of the nineteen counties were enrolled in one-teacher districts. The proportion in strictly rural areas was, of course, much higher. The average for the state was less than one-tenth in one-teacher districts.

Over a third of the rural school teachers in Bureau, Champaign, Marshall, and McLean counties in 1945 had no training beyond four years of high school. Other counties of the Prairie had only slightly better records.

Although these figures are for a war year, when teachers everywhere were scarce, figures for other years were not much better. Teacher salaries in the rural districts of the region have not been set up to attract trained teachers. Nearly half of McLean County's 184 rural teachers received less than $1,000 in 1945.

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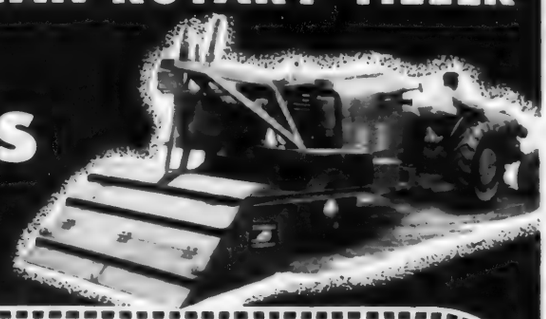

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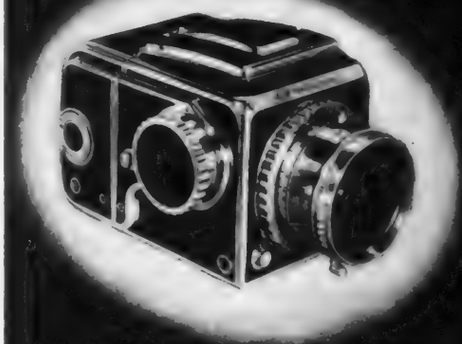

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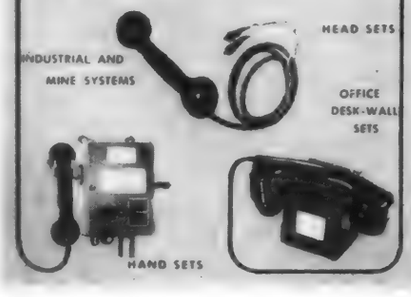

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Most counties of this wealthy Prairie spend fewer educational dollars in proportion to income than many poorer counties of the state. A high rate of absentee ownership and its complement, tenancy, offer partial explanations. The farmer who owns the land he lives on takes greater interest in his school than the farmer who does not, or than the landowner who lives miles away.

Tradition has its influence. What was good enough for grandfather is good enough for son. There is an unwillingness on the part of some rural parents to expose their children to what they consider unwholesome morals and attitudes in the city or village schools to which their children would be sent if the one-teacher school were closed.

A further drag on the drive for consolidation of school districts, a drive that has gained momentum in recent months, is a sentiment expressed by Lou Crowley of the Quick School District in Champaign County.

"The school district is the last thing in the state where the local community has the say," Mr. Crowley says.

A half century ago, the rural church supplied the spiritual needs of the Grand Prairie somewhat as the rural school catered to its intellectual training. But with the building of hard roads and the extensive ownership of automobiles that allowed rural people to attend urban churches, the rural church as an institution began a gradual decline. Many crossroads churches have been abandoned except as weatherworn storage buildings for farm machinery, corn or small grain. But some notable exceptions exist. To survive, the rural church has had to meet more than the religious needs of the community. It has become a social as well as a spiritual center. Farm Bureau socials as well as church suppers are held in the basement, and food for the body is distributed along with food for the soul.

Contrasting with the prevalent practice of tenant farming are a number of highly successful family-owned Prairie farms. One of these is the Brown farm west of Bloomington, Ill. This farm is an exception to the rule that Prairie farmers move out as soon as they have accumulated a stake. Five generations of the Brown family have lived in a large white farmhouse northeast of Delavan in Tazewell County. The thought and care of this family for their land and home make it stand out from the plainer houses of the Prairie. The house and the land around it were bought in 1842 by William Brown, a Quaker from Lancaster County, Pennsylvania. William and his wife Rachel, in two covered wagons, entered the Illinois country in 1828. They settled first along the Mackinaw River and then they bought the farm on which three generations of Browns now live.

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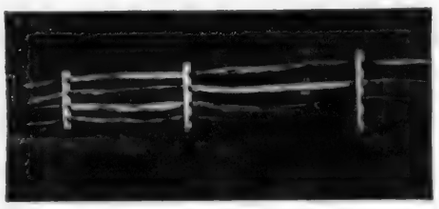

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the old white house is as new as electricity and as as old as tradition can make it. A dish that a Brown carried with him from Notingham, England, to Pennsylvania in 1673 is among the antiques in the living room. The 1805 marriage contract of William and Rachel Brown hangs on a wall upstairs. In the kitchen are an electric refrigerator and an electric dishwasher. The house creaks with tradition and it whirs with modern machinery.

A member of the state legislature, William Brown used to ride with Abraham Lincoln from Springfield to the old state capitol at Vandalia, Mrs. Lewis Brown, present grandmother in the house, reminisces. One winter day, when William had returned from Vandalia, Rachel looked in his saddlebags for the shirts she knew needed washing. She found none.

"Where are all thy shirts, William?" Rachel asked gently.

Throwing back his coat, William showed her. He had them all on. Winter Prairie winds were cold in those days, as now.

William and Daniel and Lewis, then younger Daniel, who now manages the farm, and Paul Lewis, thirteen, a high school freshman, have all inherited a love for the land and the vigor, intelligence, and ability to adapt farm practices to existing conditions.

Lewis Brown once bred trotters and pacers, and owned as many as anyone north of Kentucky, his wife relates proudly, and when trotters and pacers went out of style, the Browns switched to dairy cattle.

Last summer, when neighbors' alfalfa seedings failed, Daniel Brown's seeding was thick, rank, and nearly knee high.

"It's just like a snowball," Brown explains. "You build up your land so you can grow alfalfa. The alfalfa helps you build up your land. Then you grow better alfalfa, and the better alfalfa builds up your land some more."

Daniel Brown knows what is going on at the state university and the agricultural experiment station. He has one of the most modern "milking parlors" of its size in the state. Through wise use of cattle, lime, commercial fertilizer, and crop rotations, he has kept his land as fertile as it was when William Brown bought it over a century ago.

Like the Hissongs and the McCormicks, the Browns take vacation trips to other parts of the country. They want to know how other people live. They themselves are showing that Prairie living can be gracious living.

THE AUTHOR

Although JIM AYARS was born in a Chicago suburb, he grew up on a farm in the hilly fruit country of southwestern Michigan. After graduating from Northwestern University, he taught school in Michigan, did editorial and advertising work for a Chicago athletic periodical, and eleven years ago joined the staff of the Illinois Natural History Survey on the University of Illinois campus, Urbana. As Technical Editor, he is responsible for the publication of reports by other staff members. Surrounded by the Black Prairies, he did not find their levelness monotonous or unattractive, but saw a rich beauty in their fertility and their seasonal changes. Spare time study of the Prairie on which he lives has given him an appreciation which he likes to share with others.

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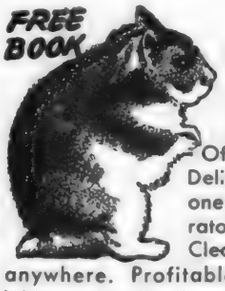

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AC Spark Plug 107
Aeroil Products Co. 130
Agricultural Laboratories 138
Allied Mills, Inc. 9
Allis-Chalmers Co. 21
American Aberdeen Angus Ass'n 128
American Brahman Breeders 125
American Chain & Cable Co. 126
American Corriedale Ass'n 140
American Guernsey Cattle Club 144
American Hampshire Sheep Ass'n 142
American Lincoln Incubator Co. 130
American Milking Shorthorn Ass'n. 120
American Polled Shorthorn Breeders 130
Ariens Company 130
Aro Equipment Company 129
Atlas Fence Company 96
Automatic Equipment Company .. 146
Babson Bros. Company 4
Baldwin Iron Works 108
Beaver Tractor Co. 136
Behlen Manufacturing Co. 146
C. S. Bell Company 146
Belle City Manufacturing Co. 102
Belsaw Machinery Co. 120
Belt Corporation 123
Biltmore Farms 142
Bolens Products 137
Boyt Harness Company 130
Bready Tractor Co. 141
Brillion Iron Works 138
Brown Forman Company 97
Buckner Manufacturing Co. 120
Burlingame, Field Pierce & Browne 128
Burnett Bros. Inc. 136
Burpee, W. Atlee 138
Bussey Products Co. 138
Campbell-Hausfeld Co. 93-114-147
Case Co., J. I. 17
Champion Nurseries 146
Chewalla Sanitary Brooder 20
Clayton & Lambert Mfg. Co. 93
Country Book Store 148
Craine Inc. 118
Dearborn Motors 10, 11
Deere & Company 13
De Laval Separator Co. 6
Doane Agricultural Service 134
Dow Chemical Co. 18
Dubois Fence & Garden Co. 144
Eagle Manufacturing Co. 139
Eagle Picher Company 100
Early & Daniel Co. 89
Electric Auto-Lite Spark Plugs .. 105
Elroy Products Co. 132
Farmer Feeder Co. 8
Fate-Root-Heath Co. 90
Firestone Tire & Rubber Co. 3
Flower City Inc. 144
Ford Motor Co. 99
Fox River Tractor Co. 95
Fragrant Herb Farm 92
Franksville Specialty Co. 93
Fulton Mfg. Company 122
Garden-All Tractor Co. 127
Gardenaid (Eastern Tractor Mfg. Corp.) 128
Gehl Bros. Mfg. Co. 98
Gilcrest Angora Center 118
Golden Arrow Farm 116
Goodrich Tire Co. 89
Gorman-Rupp Co. 114-141
Graham Paige Motor Corp. 114
Gravely Motor Plow Co. 118
Gulf Hamstery 146
Hartzell Propeller Fan Co. 131
Hauck Mfg. Company 136
Henderson, Peter Co. 123
Hobart Bros. Co. 123
Holstein-Friesian Ass'n 136
Hudson Mfg. Co., H. D. 112
Indiana Botanic Gardens 142
International Ass'n of Ice Cream Mfrs. 128
International Harvester Co. 1
Inter-State Nurseries 122
IXL Pump Company 128
Iowa Hereford Ass'n 133
Jacobsen Mfg. Co. 106
Jari Products Co. 88
Kauder, Irving 146
Kelly Bros. Nursery 116
Kemp Mfg. Company 114
Leach Company 111
Leuthardt, Henry 140
Lodge & Shipley Co. 117
Louden Machinery Co. 16
Lord & Burnham 138
Mallory Mfg. Co. 125
Marion County Chamber of Commerce 94
Martin Steel Corp. ..... Third Cover
Massey-Harris Co. 103
Merchants Creamery 92
Midland Co. 120
Milwaukee Equip. Mfg. Co. 96
Minneapolis-Moline Power Implement ..... Back Cover
Monta Mower Distributing Co. 128
Moore Bros. Corp. 128
Moto-Mower Co. 140
Mulkey Co., Sam 118
Musser Forests, Inc. 133
Myers & Bro. Co., F. E. 119
National Band & Tag Co. 134
National Turkey Institute 134
Naylor Co., H. W. 120
Nears Food Co. 20
New Holland Machine Co. 109
New Ideas Farm Equipment 15
Nitragin Company 139
Norris Cattle Company 116
Nutritional Research Co. 136
Oliver Corporation 19
Opeksit Farms 112
Oshkosh Filter & Softener 120
Ottawa Manufacturing Company 116-128-135
Ottawa Steel Products Co. 102
Papec Machine Co. 92
Parks & Sons, Joe 116
Peirson-Moore Company, Inc. 88
Perfection Steel Body Co. 101
Phelps Dodge Refining Co. 96
Pittsburgh Plate Glass Co. (Columbia Chem. Div.) 142
Prime Manufacturing Co. 118
Renk & Sons, Wm. F. 138
Reynolds Metals Co. 12
Rice Farms 144
Rusticraft Fence Co. 90
Schraders, A. & Sons 142
Scottdel, Inc. 114-136
Scott Farm Seed Co. 130
Scott Co., O. M. 94
Seagram Co., J. E. 7
Seaman Motors 143
Security Mfg. & Contracting Co. 88
Sherwin-Williams Co. 115
Simplicity Mfg. Co. 110
Sine Equipment Co. 128
Skinner Mfg. Co. 140
Smith Agricultural Chemical Co. 145
South Michigan Nursery 134
Spohn Medical Co. 134
Spring Hill Nursery 142
Squibb & Co., E. R. 14
Studebaker Corp. 2
Stumpp & Walter Co. 126
Sudbury Laboratories 113
Tennessee Corp. 104
Thompson Co., George E. 116
Tokheim Oil Tank & Pump Co. .. 139
Towner Mfg. Co. 135
Townsley Trapnest Farm 114
Tricker, Inc., Wm. 130
Universal Pump Co. 92
U. S. Instrument 144
Veg-Acre Farm 134
Victor Animatograph 145
Virginia-Carolina Chem. Corp. .. 108
Vogel Co., J. A. 94
Wayne Pump Co. 121
Willoughbys, Inc. 143
Willy's Overland Motor Co. 91
Wilson Refrigeration Company ..... Second Cover
Wisconsin Motor Corp. 132
Woodbine Farms 140
Wood Products Co. 124
Worthington Mower Co. 106
Wright Smoke Co. 124
Young Co., E. C. 114

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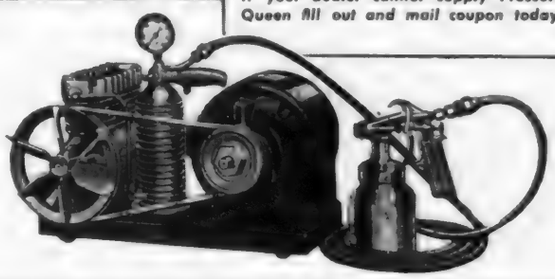

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If you prefer to send a dollar now, that will be fine—save us a lot of record keeping and save YOU the ten cent shipping charge. We'll give you DOUBLE your money back if you return the plan for any reason in 10 days! That's how sure we are you'll like it!

Act Now!

Don't hesitate. If you have a garden, farm, or country home—or hope to have a little place of your own some day—*you simply must not fail to see the "Have-More" Plan!* It will save you endless troubles and expense, solve a thousand problems and answer countless important questions for you. If it's not all we promise and more, we'll give you DOUBLE your money back! That's how sure we are you'll be delighted! Send the coupon to us now.

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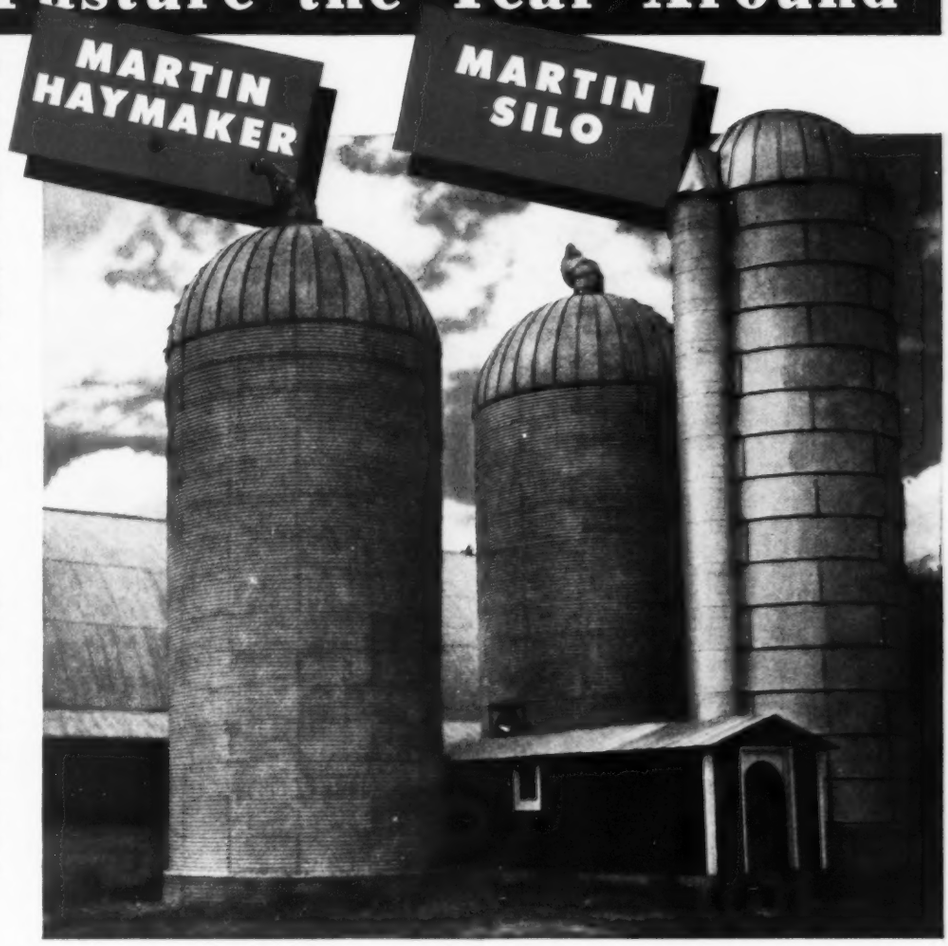

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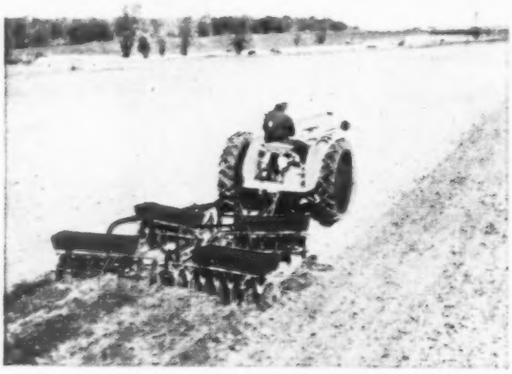

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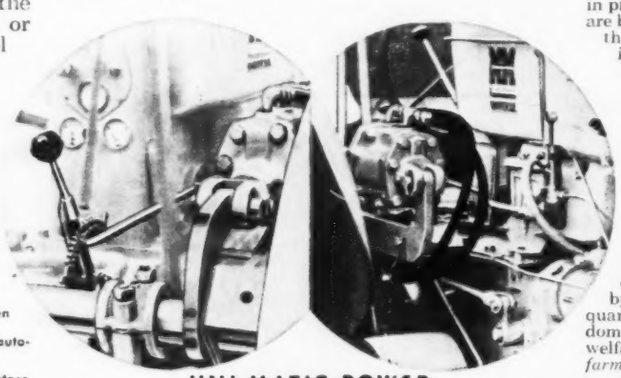

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